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by

HOWARD ROSS CRAMER

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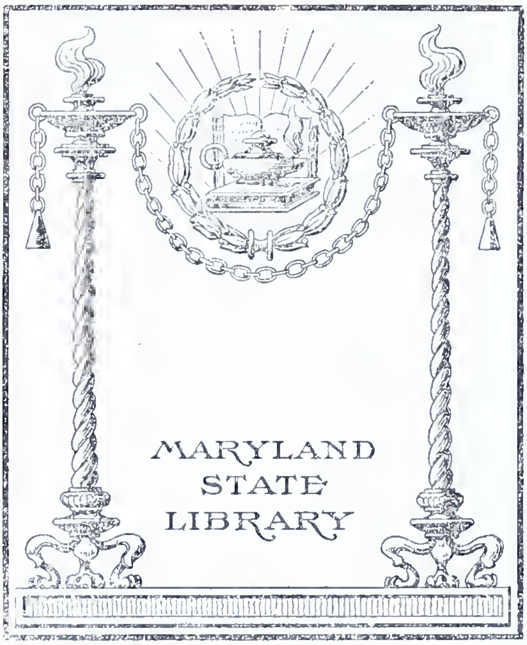

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BULLETIN G 42

Annotated Bibliography of Pennsylvania Geology–Supplement to 1959

by Howard Ross Cramer

Cooperating Geologist

Pa. Geological Survey

PENNSYLVANIA GEOLOGICAL SURVEY

FOURTH SERIES

HARRISBURG

1965

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF INTERNAL AFFAIRS
Genevieve Blatt, Secretary
BUREAU OF
TOPOGRAPHIC AND GEOLOGIC SURVEY
Arthur A. Socolow, State Geologist

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ANNOTATED BIBLIOGRAPHY OF PENNSYLVANIA GEOLOGY, SUPPLEMENT TO 1959

by

Howard Ross Cramer*

INTRODUCTION

This bibliography is a continuation of, and a supplement to, the Annotated bibliography of Pennsylvania geology to 1949, published by the Pennsylvania Geological Survey as Bulletin G-34, 1961. This bibliography contains annotations of not only those articles published about the geology of the Commonwealth between 1950 and 1959 but also those of earlier dates which were overlooked in the preparation of Bulletin G-34.

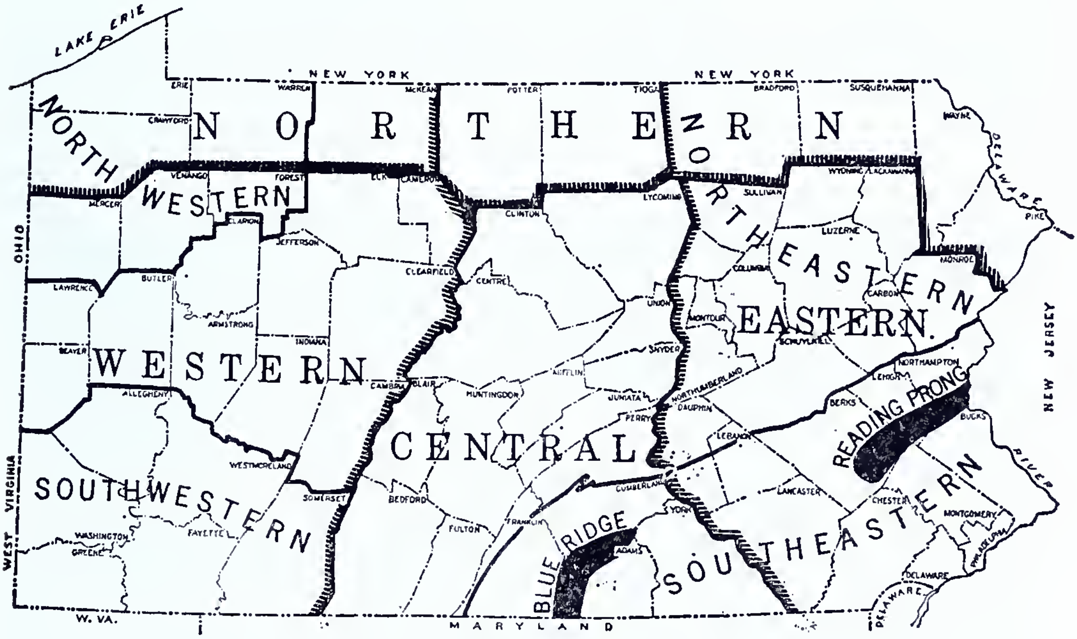

Figure 1. Index map.

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The annotation and index patterns of this supplement are similar to those established for Bulletin G-34 which were in turn modelled after those established in the Bibliography of North American Geology, published by the U. S. Geological Survey.

Each article was read, annotated, and indexed by county, subject, and stratigraphic interval where applicable. In those cases where the area involved was larger than that of a county, subdivisions of the Commonwealth were employed. These subdivisions are outlined on Fig 1. Each county and subdivision of the Commonwealth is further subdivided into aspects of geology. These aspect subheadings are similar to those employed in Bulletin G-34 but with the additions of *Engineering geology, Geochemical investigations,* and *Geophysical investigations.*

Theses from colleges and universities in the United States which include data from the Commonwealth are included but are not annotated. Abstracts are not included if the full article has appeared unless the full article is in a foreign publication or in an otherwise hard-to-obtain source. Abstracts are not annotated. Biographies of persons who have published articles relating to Pennsylvania geology are included but are not annotated.

The help of Mr. William Heers of the U. S. Geological Survey, Dr. Horace Richards of the Academy of Natural Sciences of Philadelphia, and Miss Marie Siegrist of the Geological Society of America, is gratefully acknowledged. Each provided the compiler with special library help. Mrs. Charles H. Gardner, of Atlanta, Georgia, typed the manuscript and assisted with the proofreading.

Readers are encouraged to notify the State Geologist of any omissions in this bibliography or in Bulletin G-34 so that they may be included in later supplements.

SERIAL PUBLICATIONS CITED

ACAD. NAT. SCI. PHILADELPHIA; GEOL. CENTER RESEARCH SER.; JOUR.; PROC. Academy of Natural Sciences of Philadelphia; Geological Center for Research Series; Journal; Proceedings. Published by the Academy from Philadelphia, Pennsylvania.

ACTA CRYSTALLOGRAPHICA. Acta Crystallographica. Published by the International Union of Crystallography from Copenhagen, Denmark.

ALBANY INST. TRANS. Transactions of the Albany Institute. Published by the Institute from Albany, New York.

AM. ACAD. ARTS AND SCIENCE; MEM.; PROC. American Academy of Arts and Science; Memoirs; Proceedings. Published by the Academy from Boston, Massachusetts.

AM. ALPINE JOUR. American Alpine Journal. Published by the American Alpine Club from New York City, New York.

AM. ANTIQUITY. American Antiquity. Published by the Society for American Archeology from Menasha, Wisconsin.

AM. ASSOC. ADV. SCI.; PROC.; PUB. American Association for the Advancement of Science; Proceedings; Publications. Published by the Association from New York City, New York.

AM. ASSOC. PETROLEUM GEOLOGISTS BULL. Bulletin of the American Association of Petroleum Geologists. Published by the Association from Tulsa, Oklahoma.

AM. CERAMIC SOC.; BULL.; JOUR.; TRANS. American Ceramic Society; Bulletin; Journal; Transactions. Published by the Society from Easton, Pennsylvania; the Transactions are published from Columbus, Ohio.

AM. GEOG. AND STAT. SOC. PROC. Proceedings of the American Geographical and Statistical Society. Published by the American Geographical Society of New York from New York City, New York.

AM. GEOLOGIST. American Geologist. Published commercially from Minneapolis, Minnesota.

AM. GEOPHYS. UNION TRANS. Transactions of the American Geophysical Union. Published by the National Research Council for the Union from Washington, D. C.

AM. INST. MIN. AND METALL. ENGINEERS; TECH. PUB.; TRANS. American Institute of Mining and Metallurgical Engineers; Technical Publications; Transactions. Published by the Institute from New York City, New York.

AM. INST. MIN. ENGINEERS TRANS. Transactions of the American Institute of Mining Engineers. Published by the Institute from New York City, New York.

AM. JOUR. BOTANY. American Journal of Botany. Published by the Botanical Society of America from Brooklyn, New York.

AM. JOUR. CONCHOLOGY. American Journal of Conchology. Published commercially from Philadelphia, Pennsylvania, and elsewhere.

AM. JOUR. SCI. American Journal of Science. Published commercially by Yale University from New Haven, Connecticut.

AM. JOUR. SCI. RADIOCARBON SUPP. American Journal of Science Radiocarbon Supplement. See above.

AM. MALACOLOGICAL UNION ANN. REPT. Annual Report of the American Malacological Union. Published by the Union from Philadelphia, Pennsylvania, and elsewhere.

AM. MED. AND PHIL. REGISTER. American Medical and Philosophical Register. Published commercially from New York City, New York.

AM. METEOROL. SOC. BULL. Bulletin of the American Meteorological Society. Published by the Society from Easton, Pennsylvania.

AM. MIDLAND NATURALIST. American Midland Naturalist. Published by Notre Dame University, Notre Dame, Indiana.

AM. MINERALOGIST. American Mineralogist. Published by the Mineralogical Society of America from Lancaster, Pennsylvania.

AM. MINING CONG. REPT. PROC. ANN. SESS. Report of the Proceedings of the Annual Session of the American Mining Congress. Published by the Congress from Denver, Colorado, and elsewhere.

AM. MUS. JOUR. American Museum Journal. Published by the American Museum of Natural History from New York City, New York.

AM. MUS. NAT. HIST.; BULL.; MEM. American Museum of Natural History; Bulletin; Memoirs. Published by the Museum from New York City, New York.

AM. MUSEUM NOVITATES. American Museum Novitates. Published by the American Museum of Natural History from New York City, New York.

AM. NATURALIST. American Naturalist. Published commercially by the American Society of Naturalists from Boston, Massachusetts, New York City, New York, and elsewhere.

AM. PETROLEUM INST. PROC. Proceedings of the American Petroleum Institute. Published by the Institute from New York City, New York.

AM. PETROLEUM INST. DIV. PRODUCTION PAPER. Paper No. — of the Division of Production of the American Petroleum Institute. Published by the Institute from New York City, New York.

AM. PHIL. SOC.; PROC.; TRANS.; YEARBOOK. American Philosophical Society; Proceedings; Transactions; Yearbook. Published by the Society from Philadelphia, Pennsylvania.

AM. SOC. CIVIL ENG., JOUR. SOIL MECHANICS AND FOUND. DIV. Journal of the Soil Mechanics and Foundation Division of the American Society of Civil Engineers. Published by the Society from New York City, New York.

AM. SOC. TESTING MATERIALS SPEC. TECH. PUB. Special Technical Publication of the American Society for Testing Materials. Published by the Society from different places.

ANNALES DE GEOGRAPHIE. Annales de Géographie. Published commercially from Paris, France.

ANNALES DES MINES. Annales des Mines. Published by the Ministère des Travaux Publix, des Postes, et des Télégraphies from Paris, France.

ANNALS OF IOWA. Annals of Iowa. Published by the Iowa State Historical Department from Des Moines, Iowa.

APPALACHIA. Appalachia. Published by the Appalachian Mountain Club from Boston, Massachusetts.

ASSOC. AM. GEOGRAPHERS ANNALS. Annals of the Association of American Geographers. Published by the Association from various places.

ATLANTIC JOUR. AND FRIEND OF KNOWLEDGE. Atlantic Journal and Friend of Knowledge. Published commercially from Philadelphia, Pennsylvania.

BALTIMORE MED. AND PHYS. RECORDER. Baltimore Medical and Physical Recorder. Published commercially from Baltimore, Maryland.

BAYERISCHE AKAD. WISS. JAHRBUCH. Jahrbuch der Bayerische Akademie der Wissenschaften. Published by the Academy from Munich, Germany.

BOSTON SOC. NAT. HIST.; MEM.; PROC. Boston Society of Natural History; Memoirs; Proceedings. Published by the Society from Boston, Massachusetts.

BRITISH ASSOC. ADV. SCI. REPT. Report of the British Association for the Advancement of Science. Published by the Association from London, England, and elsewhere.

BUFFALO SOC. NAT. SCI. BULL. Bulletin of the Buffalo Society of Natural Sciences. Published by the Society from Buffalo, New York.

BULLS. AM. PALEONTOLOGY. Bulletins of American Paleontology. Published by the Paleontological Research Institute from Ithaca, New York.

CANADIAN FIELD-NATURALIST. Canadian Field-Naturalist. Published by the Ottawa Field-Naturalists Club from Ottawa, Canada.

CANADIAN INST. MIN. AND METALLURGY TRANS. Transactions of the Canadian Institute of Mining and Metallurgy. Published by the Institute from Ottawa, Canada.

CANADIAN RECORD SCI. Canadian Record of Science. Published by the Natural History Society of Montreal from Montreal, Quebec, Canada.

CARNEGIE INST. WASHINGTON PUB. Publications of the Carnegie Institute of Washington. Published by the Institute from Washington, D. C.

CARNEGIE MUS. ANNALS. Annals of the Carnegie Museum. Published by the Museum from Pittsburgh, Pennsylvania.

CINCINNATI SOC. NAT. HIST. JOUR. Journal of the Cincinnati Society of Natural History. Published by the Society from Cincinnati, Ohio.

CLAY MINERALS BULL. Clay Minerals Bulletin. Published commercially from Galashiels, Scotland, and London, England.

CLAYWORKER. The Clayworker. Published by the National Brick Manufacturers Association from Indianapolis, Indiana.

COAL AGE. Coal Age. Published commercially from New York City, New York.

COAL INDUSTRY. Coal Industry. Published commercially from Pittsburgh, Pennsylvania.

COLLIERY ENGINEER. The Colliery Engineer. Published commercially from Pottsville and Scranton, Pennsylvania.

COLUMBIA UNIV., LAMONT GEOL. OBS. TECH. REPT. SEISMOLOGY. Technical Report on Seismology from the Lamont Geological Observatory of Columbia University. Published by the University from New York City, New York.

COLUMBIA UNIV. DEPT. GEOL. TECH. REPT. Technical Report from the Department of Geology of Columbia University. Published by the University from New York City, New York.

[COLUMBIA UNIV.] SCHOOL OF MINES QUART. Quarterly Bulletin of the School of Mines of Columbia University. Published by the University from New York City, New York.

COMPASS. The Compass of Sigma Gamma Epsilon. Published by the Fraternity from Menasha, Wisconsin, and elsewhere.

CUSHMAN FOUND. FORAM. RESEARCH CONTRIB. Contributions from the Cushman Foundation for Foraminiferal Research. Published for the Foundation by the Paleontological Research Institution from Ithaca, New York.

D. C. SPELEOGRAPH. D. C. Speleograph. Published by the Washington, D. C. Grotto of the National Speleological Society from Washington, D. C.

DENISON UNIV. BULL., JOUR. SCI. LABS. Journal of the Scientific Laboratories in the Bulletin of Denison University. Published by the University from Granville, Ohio.

DENISON UNIV. SCI. LAB. BULL. Bulletin of the Scientific Laboratory of Denison University. Published by the University from Granville, Ohio.

DEUTSCHE GEOL. GESELL. ZEITSCHR. Zeitschrift der Deutsche Geologische Gesellschaft. Published by the Society from Bonn, Germany, and elsewhere.

DISSERT. ABS. Dissertation Abstracts. Published by the University of Michigan from Ann Arbor, Michigan.

EARTH SCIENCE DIGEST. Earth Science Digest. Published commercially from Omaha, Nebraska.

EASTERN STATES OIL AND GAS WEEKLY. Eastern States Oil and Gas Weekly. Source is unknown. Probably limited distribution.

ECOL. MONOGRAPHS. Ecological Monographs. Published by the Ecological Society of America from Durham, North Carolina.

ECOL. SOC. AMERICA ANN. MTG. Ecological Society of America Annual Meeting. Published by the Society from different places.

ECOLOGY. Ecology. Published by the Ecological Society of America from Brooklyn, New York.

ECON. GEOLOGY. Economic Geology. Published by the Society of Economic Geologists from Lancaster, Pennsylvania.

ENG. MIN. JOUR. Engineering and Mining Journal. Published commercially from New York City, New York.

ENG. MIN. JOUR.-PRESS. Engineering and Mining Journal-Press. Published commercially from New York City, New York.

ENG. NEWS-RECORD. Engineering News-Record. Published commercially from Chicago, Illinois, and New York City, New York.

ENGINEERS CLUB PHILADELPHIA PROC. Proceedings of the Engineers' Club of Philadelphia. Published by the Club from Philadelphia, Pennsylvania.

FIELD COLUMBIAN MUS. PUB. GEOL. SER. Publications in the Geological Series of the Field Columbian Museum. Published by the Museum from Chicago, Illinois.

FIELD CONF. OF PA. GEOLOGISTS. Field Conference of Pennsylvania Geologists. Published by the host organization for field trips; the place varies.

FRANKLIN INST. JOUR. Journal of the Franklin Institute. Published by the Institute from Philadelphia, Pennsylvania.

FRONTIERS. Frontiers. Published by the Academy of Natural Sciences of Philadelphia from Philadelphia, Pennsylvania.

FUEL. Fuel. Published by the Coal Research Club from London, England.

GEOG. GESELL. WIEN. MITTH. Mittheilungen der Geographische Gesellschaft Wein. Published by the Society from Vienna, Austria.

GEOG. HIST., AND STAT. REPOSITORY. Geographical, Historical, and Statistical Repository. Published commercially from Philadelphia, Pennsylvania.

GEOG. JOUR. Geographical Journal. Published by the Royal Geographical Society from London, England.

GEOG. REVIEW. Geographical Review. Published by the American Geographical Society of New York from New York City, New York.

GEOG. ZEITSCHR. Geographische Zeitschrift. Published commercially from Leipzig, Germany.

GEOL. BUR. NEDERL. MIJNB. Geologisch Bureau voor het Nederlandsch Mijngebeid. Published by the Bureau from Heerlen, Netherlands.

GEOL. FOEREN. STOCKHOLM FORH. Geologiska Foereningen i Stockholm Forhandlingar. Published by the Society from Stockholm, Sweden.

GEOL. MAG. Geological Magazine. Published commercially from London, England.

GEOL. PALAEONTOL. ABHANDL. Geologische und Palaeontologische Abhandlungen. Published commercially from Berlin, Germany, and elsewhere.

GEOL. RUNDSCHAU. Geologische Rundschau. Published by the Geologische Vereinigung from Leipzig, Germany.

GEOL. SOC. AMERICA; BULL.; GUIDEBOOK FOR FIELD TRIPS; MEM.; PROC.; SPEC. PAPER. Geological Society of America; Bulletin; Guidebook for Field Trips; Memoirs; Proceedings; Special Papers. Published by the Society from New York City, New York.

GEOL. SOC. CHINA BULL. Bulletin of the Geological Society of China. Published by the Society from Peiping, China.

GEOL. SOC. LONDON; PROC.; QUART. JOUR. Geological Society of London; Proceedings; Quarterly Journal. Published by the Society from London, England.

GEOL. SOC. TOKYO JOUR. Journal of the Geological Society of Tokyo. Published by the Society from Tokyo, Japan.

GEOL. SURVEY CANADA; ANN. REPT.; MEM. Geological Survey of Canada; Annual Report; Memoirs. Published by the Survey from Ottawa, Canada.

GEOLOGIST. The Geologist. Published by the Geologists' Association of London from London, England.

GEOLOGISTS ASSOC. LONDON PROC. Proceedings of the Geologists' Association of London. Published by the Association from London, England.

GEOPHYS. CASE HISTORIES. Geophysical Case Histories. Published by the Society of Exploration Geophysicists from Menasha, Wisconsin.

GEOPHYSICS. Geophysics. Published by the Society of Exploration Geophysicists from Tulsa, Oklahoma, and Houston, Texas.

GEOTIMES. Geotimes. Published by the American Geological Institute from Washington, D. C.

GESELL. ERDK. BERLIN ZEITSCHR. Zeitschrift der Gesellschaft fuer Erdkunde zu Berlin. Published by the Society from Berlin, Germany.

GUIDEBOOK, FIELD CONF. OF PA. GEOLOGISTS. Guidebook to field trips for the Field Conference of Pennsylvania Geologists. Published by the host organization for the field trips; the place varies.

HARPERS NEW MONTHLY MAG. Harpers New Monthly Magazine. Published commercially from New York City, New York.

HARVARD COLL. MUS. COMP. ZOOL.; BULL.; MEM. Harvard College Museum of Comparative Zoology; Bulletins; Memoirs. Published by Harvard University from Cambridge, Massachusetts.

HARVARD FOREST BULL. Harvard Forest Bulletin. Published by Harvard University from Petersham, Massachusetts.

HIST. DE L'ACAD. ROY. DES SCI. Histoires de l'Académie Royale des Sciences. Published by the Academy from Paris, France.

ILL. GEOL. SURVEY. Illinois Geological Survey. Published by the Survey from Urbana, Illinois.

ILL. STATE ACAD. SCI. TRANS. Transactions of the Illinois State Academy of Science. Published by the Academy from Springfield, Illinois.

ILL. STATE MUS. SCI. PAPERS. Scientific Papers of the Illinois State Museum. Published by the Museum from Springfield, Illinois.

IND. ACAD. SCI. PROC. Proceedings of the Indiana Academy of Science. Published by the Academy from Indianapolis, Indiana.

INDUS. ENG. CHEM. Industrial and Engineering Chemistry. Published by the American Chemical Society from Easton, Pennsylvania.

INTERNATL. BERGWIRTSCHAFT U. BERGTECHNIK. Internationale Bergwirtschaft und Bergtechnik. Published by the Bergwirtschaftliche Gesellschaft from Halle, Germany.

INTERNATL. BOT. CONG. International Botanical Congress. Published by the host from different places.

INTERNATL. GEOL. CONG. International Geological Congress. Published by the host from different places.

INTERNATL. PETROLEUM CONG. International Petroleum Congress. Published by the host from different places.

IOWA ACAD. SCI. PROC. Proceedings of the Iowa Academy of Science. Published by the Academy from Des Moines, Iowa.

JOHNS HOPKINS UNIV. CIRC. Johns Hopkins University Circular. Published by the University from Baltimore, Maryland.

JOUR. BACTERIOLOGY. Journal of Bacteriology. Published by the Society of American Bacteriologists from Baltimore, Maryland.

JOUR. DE PHYSIQUE, DE CHIMIE, D'HIST. NAT., ET DES ARTS. Journal de Physique, de Chimie, d'Histoire Naturelle, et des Arts. Published commercially from Paris, France.

JOUR. GEOGRAPHY. Journal of Geography. Published commercially from different places.

JOUR. GEOL. EDUCATION. Journal of Geological Education. Published by the National Association of Geology Teachers from Lawrence, Kansas.

JOUR. GEOLOGY. Journal of Geology. Published by the University of Chicago from Chicago, Illinois.

JOUR. MAMMALOLOGY. Journal of Mammalology. Published by the American Society of Mammalologists from Baltimore, Maryland.

JOUR. PALEONTOLOGY. Journal of Paleontology. Published by the Paleontological Society, the Society of Economic Paleontologists and Mineralogists, and the Geological Society of America from Menasha, Wisconsin.

JOUR. SED. PETROLOGY. Journal of Sedimentary Petrology. Published by the Society of Economic Paleontologists and Mineralogists from Menasha, Wisconsin.

K. AKAD. WISS. WIEN ALMANACH. Almanach der K. Akademie der Wissenschaften zu Wien. Published by the Academy from Vienna, Austria.

K. K. NATURHISTORISCHES HOFMUS. ANNALEN. Annalen der K. K. Naturhistorisches Hofmuseum. Published by the Museum from Vienna, Austria, and elsewhere.

KY. GEOL. SURVEY; BULL.; SPEC. PUB. Kentucky Geological Survey; Bulletins; Special Publications. Published by the Survey from Lexington, Kentucky.

LA NATURE. La Nature. Published commercially from Paris, France.

LEHIGH UNIV. INST. RESEARCH CIRC. Lehigh University Institute of Research Circular. Published by the University from Bethlehem, Pennsylvania.

LINNEAEN SOC. TRANS. SER. BOT. Transactions of the Linneaen Society, Botany Series. Published by the Society from London, England.

LITERARY MAG. Literary Magazine. Published commercially from London, England.

LITERARY RECORD AND JOUR. LINNEAEN SOC. PA. COLLEGE. Literary Record and Journal of the Linneaen Society of Pennsylvania College. Published by the College from Gettysburg Pennsylvania.

M. A. R. BULL. M. A. R. Bulletin. Published by various Grottos of the National Speleological Society for the Middle Appalachian Region from different places. The name varies.

MANCHESTER GEOL. SOC. TRANS. Transactions of the Manchester Geological Society. Published by the Society from Manchester, England.

MD. GEOL. SURVEY; COUNTY REPTS.; STRATIGRAPHIC INTERVAL REPTS. Maryland Geological Survey; County Reports; Stratigraphic Interval Reports. Published by the Survey from Baltimore, Maryland.

MICH. ACAD. SCI.; BULL.; REPT. Michigan Academy of Science; Bulletins; Reports. Published by the Academy from various places.

MICH. BASIN GEOL. SOC. GUIDEBOOK ANN. EXCURSION. Guidebook for the Annual Excursion of the Michigan Basin Geological Society. Published by the Society from different places.

MICH. UNIV. MUS. PALEONTOLOGY CONTRIB. Contributions from the Museum of Paleontology of the University of Michigan. Published by the University from Ann Arbor, Michigan.

MICROPALEONTOLOGY. Micropaleontology. Published by the American Museum of Natural History from New York City, New York.

MID APPALACHIAN [REGION] BULL. Mid-Appalachian [Region] Bulletin. Published for the Mid Appalachian Region of the National Speleological Society by different Grottos from different places. The name varies.

MIN. AND GEOL. SEC. PROC. Proceedings of the Mineralogy and Geology Section of the Academy of Natural Sciences of Philadelphia. Published by the Academy from Philadelphia, Pennsylvania.

MINERAL COLLECTOR. The Mineral Collector. Published commercially from New York City, and elsewhere.

MINERAL INDUSTRIES. Mineral Industries. Published by the School of Mineral Industries of the Pennsylvania State University from State College, Pennsylvania.

MINERALOGIST. The Mineralogist. Published commercially from Portland, Oregon.

MINES AND MINERALS. Mines and Minerals. Published commercially from Scranton, Pennsylvania.

MINES MAG. Mines Magazine. Published by the Colorado School of Mines from Golden, Colorado.

MINING AND METALLURGY. Mining and Metallurgy. Published by the American Institute of Mining and Metallurgical Engineers from New York City, New York.

MINING ENG. Mining Engineering. Published by the American Institute of Mining and Metallurgical Engineers from New York City, New York.

MINING MAG. Mining Magazine and Journal of Geology, Mineralogy. . . . Published commercially from New York City, New York.

MINN. ACAD. SCI. BULL. Bulletin of the Minnesota Academy of Science. Published by the Academy from Minneapolis, Minnesota.

MONTHLY AM. JOUR. GEOLOGY. Monthly American Journal of Geology and Natural Science. Published commercially from Philadelphia, Pennsylvania.

N. J. DEPT. CONSERV., DIV. WATER POLICY AND SUPPLY SPEC. REPT. Special Report of the Division of Water Policy and Supply of the New Jersey Department of Conservation. Published by the Department from Newark, New Jersey.

N. J. STATE GEOLOGIST ANN. REPT. Annual Report of the State Geologist of New Jersey. Published by the State from Newark, New Jersey.

N. Y. ACAD. SCI.; ANNALS; TRANS. New York Academy of Science; Annals; Transactions. Published by the Academy from Albany, New York, and elsewhere.

N. Y. GEOL. SURVEY, PALEONTOLOGY. Volumes on Paleontology of the New York Geological Survey. Published by the Survey from Albany, New York.

N. Y. STATE CAB. ANN. REPT. Annual Report of the New York State Cabinet of Natural History. Published by the Cabinet [Museum] from Albany, New York.

N. Y. STATE GEOLOGIST ANN. REPORT. Annual Report of the New York State Geologist. Published by the State from Albany, New York.

N. Y. STATE MUS.; ANN. REPT.; BULL.; MEM.; REGENTS REPT. New York State Museum; Annual Reports; Bulletins; Memoirs; Regents Reports. Published by the Museum from Albany, New York.

N. Y. STATE MUS. AND SCI. SERVICE BULL. Bulletin of the New York State Museum and Science Service. Published by the Museum from Albany, New York.

NAT. HIST. SOC. NEW BRUNSWICK BULL. Bulletin of the Natural History Society of New Brunswick. Published by the Society from St. John, New Brunswick.

NAT. HISTORY. Natural History. Published by the American Museum of Natural History from New York City, New York.

NATL. ACAD. SCI.; BIOG. MEM.; MEM.; PROC. National Academy of Sciences; Biographical Memoirs; Memoirs; Proceedings. Published by the Academy from Washington, D. C.

NATL. OIL SCOUTS AND LANDSMEN'S ASSOC. YEARBOOK. Yearbook of the National Association of Oil Scouts and Landsmen. Published by the Association from Houston, Texas, and elsewhere.

NATL. RESEARCH COUNCIL PUB. Publications of the National Research Council. Published by the Council from Washington, D. C.

NATL. SPELEOL. SOC. BULL. Bulletin of the National Speleological Society. Published by the Society from Washington, D. C.

NATUR UND VOLK. Natur und Volk. Published by the Senckenbergische Naturforschende Gesellschaft from Frankfort a.Main, Germany.

NATURE. Nature. Published commercially from London, England.

NATURWISS. VEREIN NEUVORPOMMERN U. RUEGEN MITTH. Mittheilungen von der Naturwissenschaftlicher Verein von Neuvorpommern und Ruegen. Published by the Society from Greifswald, Germany.

NATUURWET. TIJDSCHR. Natuurwetenschappelijk Tijdschrift. Published commercially from Ghent, Netherlands.

NAUTILUS. Nautilus. Published commercially from Philadelphia, Pennsylvania and Boston, Massachusetts.

NETHERWORLD NEWS. Netherworld News. Published by the Pittsburgh Grotto of the National Speleological Society from Pittsburgh, Pennsylvania.

NEUES JAHRB. Neues Jahrbuch fur Mineralogie, Geologie, und Palaeontologie. Published commercially from Heidelberg and Stuttgart, Germany.

NITTANY GROTTO NEWSLETTER. Nittany Grotto Newsletter. Published by the Nittany Grotto of the National Speleological Society from State College, Pennsylvania.

NO. CAR. UNIV. ENG. EXPER. STA. BULL. Bulletin of the Engineering Experiment Station of North Carolina University. Published by the University from Chapel Hill, North Carolina.

NO. DAK. UNIV. QUART. JOUR. Quarterly Journal of the University of North Dakota. Published by the University from Grand Forks, North Dakota.

NOVA ACTA ACAD. LEOP.-CAROL. NATURAE-CURIOSORUM SUPP. Supplement to the Nova Acta of the Academiae Caeasareae Leopoldino-Carolinae Germanicae Naturae Curiosorum. Published by the Academy from Halle, Germany, and elsewhere. Also cited in German.

OHIO GEOL. SURVEY; REPRINT SER.; REPT. Ohio Geological Survey; Reprint Series; Reports. Published by the Survey from Columbus, Ohio.

OHIO JOUR. SCI. Ohio Journal of Science. Published by the Ohio Academy of Science from Columbus, Ohio.

OHIO DIV. GEOL. SURVEY BULL. Bulletin of the Ohio Division of Geological Survey. Published by the Survey from Columbus, Ohio.

OIL AND GAS COMPACT COMMISSION COMMITTEE BULL. Bulletin of the Oil and Gas Compact Commission Committee. Published by the Committee from Oklahoma City, Oklahoma.

OIL AND GAS JOUR. Oil and Gas Journal. Published commercially from Dallas, Texas, and elsewhere.

OIL FORUM. Oil Forum. Published commercially from New York City, New York.

OTTAWA NATURALIST. Ottawa Naturalist. Published by the Ottawa Field-Naturalists Club from Ottawa, Canada.

PA. ACAD. SCI. PROC. Proceedings of the Pennsylvania Academy of Science. Published by the Academy from Harrisburg, Pennsylvania.

PA. DEPT. INTERNAL AFFAIRS MONTHLY BULL. Monthly Bulletin of the Pennsylvania Department of Internal Affairs. Published by the Department from Harrisburg, Pennsylvania.

PA. GEOL. SURVEY 2ND. Second Pennsylvania Geological Survey (1874-1887).

PA. GEOL. SURVEY 4TH SER.; GEOL. ATLAS; COUNTY REPT.; INF. CIRC.; GENERAL GEOL. REPT.; MIN. RES. REPT., PROG. REPT.; SPEC. BULL.; WATER RES. REPT.; WELL SAMPLE RECORD. Pennsylvania Geological Survey 4th Series (1919-); Geologic Atlas; County Report; Information Circular; General Geology Report; Mineral Resource Report; Progress Report; Special Bulletin; Water Resource Report; Well Sample Record. Published by the Survey from Harrisburg, Pennsylvania.

PA. STATE COLL., AGRICULTURE EXPER. STA. BULL. Bulletin of the Agriculture Experiment Station of the Pennsylvania State College. Published by the College from State College, Pennsylvania.

PA. STATE COLL., MINERAL INDUSTRIES EXPER. STA.; BULL.; CIRC.; TECH. REPT. Pennsylvania State College Mineral Industries Experiment Station; Bulletin; Circular; Technical Report. Published by the College from State College, Pennsylvania.

PA. STATE COLL., SCHOOL OF MINERAL INDUSTRIES TECH. REPT. Technical Report from the School of Mineral Industries of Pennsylvania State College. Published by the College from State College, Pennsylvania.

PA. STATE UNIV., DEPT. GEOLOGY CONTRIB. Contributions from the Department of Geology of the Pennsylvania State University. Published by the Department from State College, Pennsylvania.

PA. STATE UNIV., MINERAL INDUSTRIES EXPER. STA.; BULL.; CIRC.; TECH. REPT. Pennsylvania State University Mineral Industries Experiment Station; Bulletin; Circular; Technical Report. Published by the University from State College, Pennsylvania.

PA. TOPOG. GEOL. SURVEY [3RD SER.] REPT. Report of the [3rd] Pennsylvania Topographical and Geological (Commission) Survey (1899-1919). Published by the Survey from Harrisburg, Pennsylvania

PALAEONTOGRAPHICA. Palaeontographica. Published commercially from Stuttgart and Kassel, Germany.

PALAEONTOGRAPHICA AMERICANA. Palaeontographica Americana. Published by the Paleontological Research Institute from Ithaca, New York.

PAN-AM. GEOLOGIST. Pan-American Geologist. Published commercially from Des Moines, Iowa.

PEKING NAT. HIST. BULL. Peking Natural History Bulletin. Published by the Peking Society of Natural History from Peking, China.

PENNSYLVANIA ANGLER. The Pennsylvania Angler. Published by the Pennsylvania Board of Fish Commissioners from Harrisburg, Pennsylvania.

PENNSYLVANIA PLANNING. Pennsylvania Planning. Published by the Pennsylvania State Planning Board from Harrisburg, Pennsylvania.

PETERMANN'S MITTH. AUS J. PERTHES' GEOG. ANSTALT. Petermann's Mittheilungen aus Justus Perthes' geographischer Anstalt. Published commercially from Gotha, Germany.

PETROLEUM AGE. Petroleum Age. Published commercially from Bradford, Pennsylvania.

PETROLEUM ENGINEER. The Petroleum Engineer. Published commercially from Tulsa, Oklahoma and Dallas, Texas.

PHILADELPHIA MED. AND PHYS. JOUR. SUPPL. Supplement to the Philadelphia Medical and Physical Journal. Published commercially from Philadelphia, Pennsylvania.

PIT AND QUARRY. Pit and Quarry. Published commercially from Chicago, Illinois.

PITTSBURGH UNIV. BULL. Pittsburgh University Bulletin. Published by the University from Pittsburgh, Pennsylvania.

POLARFORSCHUNG. Polarforschung. Published commercially from Kiel and Goslar, Germany.

POP. SCI. MONTHLY. Popular Science Monthly. Published commercially from New York City, New York.

PROBLEMI FIZIOCHESKOI GEOGRAFII. Transliterated from Russian. Published by the Geographical Institute of the Academy of Sciences of the U. S. S. R. from Moscow and Leningrad, Russia.

PRODUCERS MONTHLY. Producers Monthly. Published commercially from Bradford, Pennsylvania.

PSYCHE. Psyche. Published by the Cambridge Entomological Club from Boston and Cambridge, Massachusetts.

REV. QUESTIONS SCIENTIFIQUES. Revue des Questions Scientifiques. Published by the Societé scientifique de Bruxèlles from Brussels, Belgium, and elsewhere.

RIV. GEOG. ITALIANA. Rivista Geográfica Italiana. Published by the Societa di Studi Geográfici e Coloniali from Florence, Italy.

ROCHESTER ACAD. SCI. PROC. Proceedings of the Rochester Academy of Science. Published by the Academy from Rochester, New York.

ROCKS AND MINERALS. Rocks and Minerals. Published commercially by the Rocks and Minerals Association from Peekskill, New York.

ROY. INST. GREAT BRITAIN. Royal Institution of Great Britain. Published by the Institution from London and elsewhere.

ROY. SOC. CANADA PROC. AND TRANS. Proceedings and Transactions of the Royal Society of Canada. Published by the Society from Ottawa and Montreal, Canada.

ROY. SOC. CANADA TRANS. Transactions of the Royal Society of Canada. Published by the Society from Montreal and Ottawa, Canada.

SCHWEIZER GEOGRAPH. Der Schweizer Geograph. Published by the Verein schweizerischer Geographie-lehrer and the Geographische Gesellschaft from Bern, Switzerland.

SCIENCE. Science. Published commercially from New York City, New York and elsewhere.

SCIENCE PROGRESS. Science Progress. Published commercially from London, England.

SCI. AMERICAN. Scientific American. Published commercially from New York City, New York.

SCI. AMERICAN SUPPL. Scientific American Supplement. Published commercially from New York City, New York.

SCI. MONTHLY. Scientific Monthly. Published commercially from New York City, New York.

SEISMOL. SOC. AMERICA BULL. Bulletin of the Seismological Society of America. Published by the Society from Stanford University, California.

SIERRA CLUB BULL. Sierra Club Bulletin. Published by the Club from San Francisco, California.

SMITHSON. INST. ANN. REPT. Annual Report of the Smithsonian Institution. Published by the Institution from Washington, D. C.

SMITHSON. MISC. COLL. Smithsonian Miscellaneous Collections. Published by the Smithsonian Institution from Washington, D. C.

SOC. GEOG. NAC. MADRID BOL. Boletin di Sociedad Geográfica nacional. Published by the Society from Madrid, Spain.

SOC. GEOL. BELGIQUE MEM. Mémoires de la Societé géologique de Belgique. Published by the Society from Liege, Belgium.

SOC. GEOL. FRANCE BULL. Bulletin de la Societé géologique de France. Published by the Society from Paris, France.

SOC. GEOL. NORD ANNALES. Annales de la Societé géologique du Nord. Published by the Society from Lille, France.

SOC. VERTEBRATE PALEONTOLOGY NEWS BULL. News Bulletin of the Society of Vertebrate Paleontology. Published by the Society from Cambridge, Massachusetts, and elsewhere.

SOIL SCIENCE. Soil Science. Published commercially from Baltimore, Maryland.

SOIL SCI. SOC. AM. PROC. Proceedings of the Soil Science Society of America. Published by the Society from Ann Arbor, Michigan.

SPELEO DIGEST. Speleo Digest. Published by members of the Pittsburgh Grotto of the National Speleological Society from Pittsburgh, Pennsylvania.

STATE GEOLOGISTS JOUR. The State Geologists' Journal. Published by the Association of American State Geologists from different locations.

TENN. ACAD. SCI. JOUR. Journal of the Tennessee Academy of Science. Published by the Academy from Nashville, Tennessee, and elsewhere.

TERRA. Terra. Published by the Suomen Maantiiteellinen Seura and the Geografiska Sallskapet i Finland from Helsingfors, Finland.

TORREY BOT. CLUB BULL. Bulletin of the Torrey Botanical Club. Published by the Club from New York City, New York.

TULSA GEOL. SOC. DIGEST. Tulsa Geological Society Digest. Published by the Society from Tulsa, Oklahoma.

U. S. BUR. MINES; BULL.; INF. CIRC.; REPT. INV.; TECH. PAPER. U. S. Bureau of Mines; Bulletin; Information Circular; Reports of Investigation; Techincal Paper. Published by the Bureau from Washington, D. C.

U. S. CENSUS. U. S. Census. Published by the U. S. Bureau of the Census from Washington, D. C.

U. S. COAST AND GEOD. SURVEY SER. U. S. Coast and Geodetic Survey Serial. Published by the U. S. Department of Commerce from Washington, D. C.

U. S. DEPT. AGRIC. BUR. CHEM. BULL. Bulletin of the Bureau of Chemistry of the U. S. Department of Agriculture. Published by the Department from Washington, D. C.

U. S. GEOL. GEOG. SURVEY TERR. (HAYDEN) ANN. REPT. Annual Report of the U. S. Geological and Geographical Survey of the Territories, F. V. Hayden in charge. Published by the U. S. Government from Washington, D. C.

U. S. GEOL. SURVEY; ANN. REPT.; BULL.; CIRC.; COAL INV. MAP; GEOL. QUAD. MAP; GEOPHYS. INV. MAP; INDEX GEOL. MAPPING U. S.; MISC. GEOL. INV. MAP; MON.; OIL AND GAS INV. MAP; PRELIM. REPT.; PROF. PAPER; TRACE ELEM. INV.; WATER-SUPPLY PAPER. U. S. Geological Survey; Annual Report; Bulletin; Circular; Coal Investigations Map; Geological Quadrangle Map; Geophysical Investigations Map; Index to Geological Mapping in the United States; Miscellaneous Geological Investigations Map; Monograph; Oil and Gas Investigations Maps; Preliminary Reports; Professional Paper; Trace Element Investigations; Water-Supply Paper. Published by the Survey from Washington, D. C.

U. S. NATL. MUS. PROC. Proceedings of the United States National Museum. Published by the Museum from Washington, D. C.

UNIV. ARIZ. PRESIDENT'S REPT. Report of the President of the University of Arizona. Published by the University from Tucson, Arizona.

UNIV. PA. PUBS., SER. PHIL. LIT., AND ARCHEOLOGY. University of Pennsylvania Publications, Series in Philosophy, Literature, and Archeology. Published by the University from Philadelphia, Pennsylvania.

VA. ACAD. SCI. PROC. Proceedings of the Virginia Academy of Science. Published by the Academy from Charlottesville, Virginia, and elsewhere.

VA. JOUR. SCI. Virginia Journal of Science. Published by the Virginia Academy of Science from Charlottesville, Virginia.

VEREINIG. SCHWEIZER PETROLEUM-GEOLOGEN U. –ING. BULL. Bulletin der Vereinigung der Schweizer Petroleum-Geologen und –Ingeniure. Published by the Society from Basel, Switzerland.

VERHANDL. K. LEOP.-CAROL. AKAD. NATURFORSCHER SUPP. Verhandlungen der K. Leopoldinisch-Carolinische Deutsche Akademie der Naturforscher, Supplementband. Published by the Academy from Bonn, Breslau, and elsewhere. Sometimes cited in Latin.

W. VA. ACAD. SCI. PROC. Proceedings of the West Virginia Academy of Science. Published by the Academy from Morgantown, West Virginia.

W. VA. GEOL. SURVEY REPT. INV. Report of Investigations of the West Virginia Geological Survey. Published by the Survey from Morgantown, West Virginia.

W. VA. UNIV. BULL. Bulletin of West Virginia University. Published by the University from Morgantown, West Virginia.

WAGNER FREE INST. SCI.; BULL.; TRANS. Wagner Free Institute of Science; Bulletin; Transactions. Published by the Institute from Philadelphia, Pennsylvania.

WASH. ACAD. SCI. JOUR. Journal of the Washington Academy of Science. Published by the Academy from Washington, D. C.

WESTERN RESERVE HIST. SOC. TRACT. Tracts of the Western Reserve Historical Society. Published by the Society from Cleveland, Ohio.

WESTERN SOC. ENGINEERS JOUR. Journal of the Western Society of Engineers. Published by the Society from Chicago, Illinois.

WILSON BULL. Wilson Bulletin. Published by the Wilson Ornithological Club and the Nebraska Ornithologists Union from Oberlin, Ohio.

WORLD OIL. World Oil. Published commercially from Houston, Texas.

WYOMING HIST. AND GEOL. SOC. PROC. AND COLL. Proceedings and Collections of the Wyoming [Valley] Historical and Geological Society. Published by the Society from Wilkes-Barre, Pennsylvania.

YALE UNIV. PEABODY MUS. BULL. Bulletin from the Peabody Museum of Yale University. Published by the University from New Haven, Connecticut.

ZEITSCHR. GLETSCHERKUNDE. Zeitschrift fuer Gletscherkunde, feur die Eiszeitforschung und der Geschichte der Klimas. Published by the Internationale Gletscherkommission from Berlin, Germany.

ZEITSCHR. KRISTALLOGRAPHIE. Zeitschrift fuer Kristallographie, die Mineralogie und die Petrographie. Published commercially from Leipzig, Germany.

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2. A geologic time scale: Eng. Min. Jour.-Press, v. 115, p. 1106-1108, tables, 1923. A semi-popular, generalized description of the geologic time scale and its development includes that adopted for the Commonwealth.
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4. Production and reserves of the Pittsburgh coal bed: Am. Inst. Min. and Metall. Engineers Trans., v. 130, p. 56-63, 1938; discussions, p. 63-64. The Pittsburgh bed is the most valuable single mineral deposit yet known to man. Figures from different states are presented to support this statement. Pennsylvania has over seven billion tons in reserve, and has already had over three billion tons mined, for a value of almost five billion dollars.
5. The anthracite fields of Pennsylvania, *in* Analyses of Pennsylvania anthracitic coals: U. S. Bur. Mines Tech. Paper 659, p. 1-12, illus., 1944. A generalized resumé of the stratigraphy and structure of the fields includes an estimated reserve of over sixteen billion tons.
6. Bituminous coal reserves of Pennsylvania: Pa. Acad. Sci. Proc., v. 24, p. 198-202, 1950. The factors involved in reserve-estimation are reviewed, as are some previous reserve-estimates. The latest reserve figure is over twenty-eight billion tons. This, if used at the present rate, should last 240 years. Over 75 percent of it is in eight counties, and over half is in Greene and Washington Cos.

ASHMEAD, DEVER C.

1. Mining of thin coal beds in the anthracite region of [northeastern] Pennsylvania: U. S. Bur. Mines Bull. 245, 113 p., illus., 1927. Engineering problems associated with thin-bed mining are extensively described. A correlation of the various thin anthracite beds in the various fields is given.

ATWOOD, WALLACE WALTER, 1872-1949, *see* Fenneman, N. M., 3.

AUER, VAINO

1. William Morris Davis [1850-1934]: Terra, v. 46, p. 134-135, Helsinki, 1934. [in Finnish]

AUERBACH, PAULINE D.

1. (and Benedict, D. K.). The geology of Ithan Creek Valley and vicinity [Delaware Co.]. M. A. thesis, Bryn Mawr Coll., 1939.

AYRES, EUGENE, *see* Heald, K. C., 1.

BABCOCK, KENDRIC CHARLES

1. The published writings of William Phipps Blake, 1850-1910: Univ. Ariz. President's Rept. 1909, 23 p., 1910.

BACHE, A. D., *see* Rogers, H. D., 1.

BACON, LLOYAL ORRIN

1. Gravity surveys of central Pennsylvania: Am. Geophys. Union Trans., v. 35, p. 495-502, illus., 1954. No distinct relationships between gravity anomalies and major structural folding along the Allegheny Front were found. However, data indicate that an intrusion or an upthrust of the basement occurs east of the Front. Either of these features could cause the salient of the Appalachian Mountains in central Pennsylvania.

BAILEY, JACOB WHITMAN, 1811-1857.

1. On the detection of spirally dotted, or scalariform ducts, and other vegetable tissues in anthracite coal: Am. Jour. Sci. 2d ser., v. 1, p. 407-410, illus., 1846. Structures from partly-burned anthracite coal are described. They are recognized as ducts of some sort, associated with the vascular system of the original plant material, irregularly scattered about, and are not trunks of trees, as had theretofore been suggested.

BAIN, GEORGE WILLIAM

1. Triassic age rift structure in eastern North America: N. Y. Acad. Sci. Trans. 2d ser., v. 19, p. 489-502, illus., 1957. The Commonwealth is included in a description of the eastern United States. Evidence is shown to support the hypothesis that the Triassic basins are rifts, rather than normal faults. None of the evidence comes from Pennsylvania, however.

BAIRD, DONALD

1. Triassic reptile footprint faunules from Milford, New Jersey: Harvard Coll. Mus. Comp. Zool. Bull., v. 117, p. 447-520, illus., 1957. A review of the footprint fauna includes discussion of many from the Commonwealth. Unnamed tracks from York Co. are described and illustrated. *Anchisauripus* from York Co. is re-evaluated and named cf. *Coelurosaurichnus*. A *Rhyncosauroides* track from Adams Co. is described.

BAIRD, THOMAS

1. Draft [map] of a body of land situate in Pinegrove and Williams Valley Townships, Schuylkill County, the property of Richards, Baird, and Obrien. Scale, 100 perches per inch, Philadelphia, P. S. Duval, [n.d.] [?18--].
2. Map of the bituminous and anthracite coal field in Dauphin, Lebanon, and Schuylkill Counties, Lykens Valley, Bear Valley, and Swatara anthracite regions. Scale, 6600 feet per inch, [?Phila.] [n.d.] [?18--].
3. Description of a tract of coal land, the property of Messrs. Richards, Baird, and O'brien, situated in Pinegrove Township, Schuylkill County . . . . 13 p., illus., Reading, Pa., Boyer and Getz, 1845. Four mineable seams of anthracite on Sharp and Broad Mountains are described and mapped.

BAKER, HORACE BURRINGTON

1. Henry Augustus Pilsbry, 1862-1957: Am. Malacological Union Ann. Rept. 1957, p. 1, port., 1958.
2. (and others). Henry Augustus Pilsbry, 1862-1957: Nautilus, v. 71, p. 73-112, ports., 1958.

BAKER, R. C., *see* Klemic, H., 2.

BAKER, WILLIAM A., JR., *see* Swartz, C. K., 3.

BALK, CHRISTINA LOCHMAN

1. (and Wilson, J. L.). Cambrian biostratigraphy in North America: Jour. Paleontology, v. 32, p. 312-350, illus., 1958. A detailed, inclusive description of Cambrian biostratigraphy includes central Pennsylvania. Trilobite genera in the various zones are charted. No relationships to lithostratigraphic units are discussed.

BALSLEY, JAMES ROBINSON, JR., *see* Hawkes, H. E., Jr., 2.

BARBOUR, GEORGE BROWN

1. John Lyon Rich, 1884-1956: Assoc. Am. Geographers Annals, v. 48, p. 174-177, port., 1958.

BARGER, JOHN

1. Hesston Cave (new addition) [Huntingdon Co.]: Netherworld News, v. 4, no. 5, 1956; Speleo Digest 1956, pt. 1, p. 1-84, 1-88(‡), illus., 1957. A map of an additional area in the cave is given.
2. Weller's Cave [Huntingdon Co.]: Netherworld News, v. 4, no. 5, 1956; Speleo Digest 1956, pt. 1, p. 1-84 - 1-85 (‡), illus., 1957. A cave in Ordovician limestone is described; a sketch map is included.

BARKSDALE, HENRY COMPTON

1. (and others). Ground-water resources in the tri-state region adjacent to the lower Delaware River: N. J. Dept. Conserv., Div. Water Policy and Supply Spec. Rept. 13, xiii, 190 p., illus. incl. geol. maps, 1958; summary (with P. H. Jones) Pa. Dept. Internal Affairs Monthly Bull., v. 21, no. 2, p. 3-10, 26, illus., 1953. A survey of the geological formations with water-bearing potential includes those in Bucks, Chester, Delaware, Montgomery, and Philadelphia Cos. Precambrian, lower Paleozoic, and Triassic rocks are discussed. A generalized geological map is included.

BARLOW, ALFRED ERNEST, 1861-1914.

1. The nickel and copper deposits of Sudbury, Ontario: Geol. Survey Canada Ann. Rept., v. 14, pt. H, 236 p., illus., 1901. A brief history of the nickel mining operations at the Gap Mine, Lancaster Co., is included.
2. Corundum, its occurrence, distribution, exploitation, and uses: Geol. Survey Canada Mem. 57, 377 p., illus., 1915. A detailed discussion includes a brief resumé of corundum occurrences in Delaware and Chester Cos. No new data are included.

BARRELL, JOSEPH, 1869-1919.

1. Grove Karl Gilbert [1843-1918], an appreciation: Sierra Club Bull., v. 10, p. 397-399, 1919.

BARROIS, CHARLES

1. Notice sur James Hall [1811-1898]: Soc. géol. France Bull. 3d ser., v. 27, p. 168-173, Paris, 1899.

BARTLETT, HARLEY

1. William Herbert Hobbs (1864-1923): Am. Phil. Soc. Yearbook 1955, p. 442-460, 1956.

BARTON, DOROTHY K. BENEDICT, *see* Benedict, Dorothy K.

BASCOM, FLORENCE, 1862-1945.

1. The geology of the crystalline rocks of Cecil County: Md. Geol. Survey, Cecil Co., p. 83-148, illus. incl. geol. map, 1902. A detailed account and description of Precambrian [?] metamorphic rocks includes references to exposures in Lancaster and Chester Cos. Mica-gneiss, granite gneiss, gabbro, metagabbro, meta peridotite, meta pyroxenite, pegmatites, and dikes are described.

BASSLER, HARVEY, *see also* Swartz, C. K., 2.

1. The glacial geology of the Great Valley of Pennsylvania. M. S. thesis, Lehigh Univ., [n.d.].

BASSLER, RAY SMITH, *see also* Swartz, C. K., 5; Ulrich, E. O., 1, 2.

1. The bryozoan fauna of the Rochester Shale: U. S. Geol. Survey Bull. 292, 136 p., illus., 1906. Descriptions and illustrations of many from the Commonwealth are included.
2. (and Kellett, B.). Bibliographic index of Paleozoic Ostracoda: Geol. Soc. America Spec. Paper 1, xiii, 500 p., illus., 1934. Lists of ostracode genera and species from many parts of the Commonwealth and from the Ordovician, Silurian, and Devonian Systems are included.
3. Edward Oscar Ulrich (1857-1944): Am. Assoc. Petroleum Geologists Bull., v. 28, p. 687-689, port., 1944.
4. Faunal lists and descriptions of Paleozoic corals: Geol. Soc. America Mem. 44, 315 p., illus., 1950. Coral occurrences are listed from Ordovician, Devonian, and Pennsylvanian rocks. The following Ordovician corals are described and illustrated: *Lichenaria major* from Blair Co., *Foerstephyllum magnificum* from Franklin Co., *F. parvulum* from Mifflin Co., *Tetradium syringoparoides*

from somewhere in Pennsylvania, *T. cellulosum* and *T. expansum* from Centre Co., *T. romingeri* and *T. spiculatum* from Franklin Co., *Paleoalveolites carterensis* from Blair Co., and *P. angulatus* from Franklin Co.

BATES, THOMAS FULCHER, *see also* Griffiths, J. C., 8; Weaver, C. E., 1, 2.

1. (and Mink, J. F.). Morphology and structure of the serpentine minerals: Pa. State Coll. Mineral Industries [Exper. Sta.] Tech. Rept. 3, 30 p. (‡), illus., 1950. Electron microscope, x-ray, and differential thermal analysis studies show that chrysotile crystallizes in tubular fibres, whereas antigorite characteristically has a lath-like, or platy structure. Some of the samples are from southeastern Pennsylvania.
2. (and Wright, H. D.). An investigation of the mineralogy, petrography and paleobotany of uranium-bearing shales and lignites. Scope A—Shales. 5th Ann. Rept. . . . 113 p., Univ. Park, Pa., Pa. State Univ., School of Mineral Industries, A.E.C. NYO-7411, 1956. Shale from the Allegheny Formation in Clearfield Co. is examined in an investigation of the occurrence of uranium in various types of rocks. The composition of the shale, including uranium percentage, is given in tabular form.
3. Selected electron micrographs of clays and other fine-grained minerals: Pa. State Univ., Mineral Industries Exper. Sta. Circ. 51, vi, 61 p., illus., [1958]. Photographs include dickite from Schuylkill Co., kaolinite from Blair, Cumberland, and Cambria Cos., halloysite from Cumberland Co., illite from Huntingdon. Centre, and Clearfield Cos., K-bentonite from Centre Co., quartz from Cumberland Co., and chert from Blair Co.

BAULING, HENRI

1. William Morris Davis [1850-1924]; master of method: Assoc. Am. Geographers Annals, v. 40, p. 188-195, 1950.

BAYLES, ROBERT ELLERY, *see* Sherrill, R. E., 1.

BEAMER, NORMAN HOWARD, *see* Noecker, M., 1.

"BEAR VALLEY COAL COMPANY"

1. Reports of Prof. William F. Rogers . . . Henry Thomas, esq. . . . [and others]. [Dauphin, Schuylkill Cos.]. 73 p., illus., Boston, Wright and Potter, 1863. In a stock prospectus, geological reports by the above and T. S. Ridgway, W. R. Johnson, J. Hall, and S. H. Kneass are quoted, describing the occurrence of anthracite coal in the Bear Valley area.

BEAUJOUR, LOUIS AUGUSTE FELIX de, 1763-1836.

1. Apercu des États Unis . . . . 274 p., illus. [map by W. Maclure], Paris, L. G. Michaud, 1814; English ed., 363 p., London, J. Booth, 1814. An extremely cursory description of the United States includes the Commonwealth. A colored-line map delineates Alluvial, Primitive, Transition, and Secondary formations, all of which are in the Commonwealth

BECHDOLT, A. F.

1. Influence of geological structure on history in the United States: Minn. Acad. Sci. Bull., v. 2, p. 72-86, 1881. A brief survey of the physiography of the Commonwealth is followed by a discourse of the effects of topography on human development. The type of soil and bedrock determined the lot of many people. The effects of topography on railroad and canal development are shown, as are shown the effects of the various mineral resources.

BECK, HERBERT HUEBNER, *see* Bibbins, A. B., 1.

BECK, THEODORIC ROMEYN, 1791-1855.

1. [Bituminous coal from Tioga Co.] [abs.]: Albany Inst. Trans., v. 1, pt. 2, app. p. 34, 1830.

BECKER, HERMAN FREDERICK

1. (and Donn, W. L.). A new occurrence and description of the fossil *Arthrophycus* [Blair Co.]: Science, v. 115, p. 214-215, illus., 1952. *Arthrophycus* from Silurian Tuscarora Quartzite is described and illustrated. A history of the name is given.

BEECHER, CHARLES EMERSON, 1856-1904.

1. Restoration of *Stylonurus lacoanus,* a giant arthropod from the Upper Devonian of the United States: Am. Jour. Sci. 4th ser., v. 10, p. 145-150, illus., 1900; Geol. Mag. 4th dec., v. 7, p. 481-485, illus., London, 1900. This giant merostome, reconstructed from different fragments, many of which are from the Commonwealth, is illustrated.

BEELER, D. O.

1. Report on Mine and Rattlesnake Hills, Durham Township, Bucks County, Pa. Unpublished rept., Lehigh Univ., 1949. [not seen]

BEERBOWER, JAMES RICHARD

1. Paleoecology of the Centerfield coral zone, East Stroudsburg locality, Monroe County, Pennsylvania: Pa. Acad. Sci. Proc., v. 31, p. 91-97, illus., 1957. Several relatively distinct sub-zones with different faunas are present. Three generic associations are evident from statistical studies; environmental controls are postulated, such as substrate change or rate of sedimentation. Genera are listed; a section is measured.
2. (and Hait, M. H., Jr.). Silurian fish in [Monroe Co.] northeastern Pennsylvania and northern New Jersey: Pa. Acad. Sci. Proc., v. 33, p 198-203, illus., 1959. Parts of *Archeogonaspis vaningeni* are described and illustrated. They occur in the Bloomsburg Formation near Stroudsburg and near Ross Common. They are from a fresh- or brackish-water environment.

BEHRE, CHARLES H., JR.

1. Slate in Northampton County, Pennsylvania. Ph.D. thesis, Univ. Chicago, 1926.

BELL, ISAAC LOWTHIAN

1. Notes of a visit to coal and iron works in the United States. 66 p., Newcastle-on-Tyne, 1875. [not seen]
2. On the American iron trade and its progress during sixteen years, *in* Iron and Steel Inst. in America, Spec. Vol. of "Proc.", p. 1-208, illus., London, E. and F. N. Spon, 1892. A review of the entire iron trade, as reported by a British observer, includes descriptions of the ore occurrences in the United States and the Commonwealth. No new data are given, however. A geological map of the United States is included, along with a survey of the coal fields. Some analyses are included.

BELL, JOHN, 1796-1872.

1. Mineral and thermal springs of the United States and Canada. 394 p., Philadelphia, Parry and McMillan, 1855. A treatise, from the medical point of view, of the delights, joys, and benefits to be derived from drinking mineral water is followed by descriptions of many springs. Some are from the Commonwealth. The waters of many are analyzed. The medicinal claims are riotous.

BELLERJEAU, ORWYN T.

1. Geology of Pinetop and Camels Hump, Bethlehem [Northampton Co.], Pennsylvania. M. S. thesis, Lehigh Univ., 1917.

BENDER, MARTIN S.

1. The carnivores of the New Paris sinkholes, Bedford County, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1955.

BENEDICT, DOROTHY K., *see* Auerbach, P. D., 1.

BENJAMIN, MARCUS, 1857-1932.

1. Charles Abiathar White [1826-1910]: Science, v. 32, p. 146-149, 1910.
2. George Perkins Merrill [1854-1929]: Science, v. 70, p. 274-275, 1929; Am. Jour. Sci. 5th ser., v. 18, p. 364, 1929.

BENNETT, BRUCE L., *see* Bromery, R. W. 1, 6, 7, 13.

BERGENBACK, RICHARD E.

1. A petrographic study of the Bald Eagle, Juniata, and Tuscarora Formations in central and eastern Pennsylvania. M. S. thesis, Lehigh Univ., 1950.

BERQUIST, STANARD GUSTAF

1. Memorial to Frank Leverett [1859-1943]: Science, v. 99, p. 312-313, 1944.

BERGSTEN, JOHN M., *see* Lytle, W. S., 7, 9.

BERKEY, CHARLES PETER, 1867-1955.

1. Charles Richard Van Hise (1857-1918): Am. Mus. Jour., v. 18, p. 705-706, 1918.
2. Edmund Otis Hovey (1862-1924): Science, v. 60, p. 559-560, 1924.
3. [Edward Salisbury Dana, 1849-1935]: Geol. Soc. London Quart. Jour., v. 92, Proc., p. lxxxix-xci, 1936.

BERMAN, JOSEPH

1. A detailed petrological and structural study of Springfield Quarry, Delaware County, Pennsylvania. M. S. thesis, Univ. Pa., 1937.

BERRY, EDWARD WILBUR, 1875-1945.

1. The American species referred to *Thinnfeldia:* Torrey Bot. Club Bull., v. 30, p. 438-445, 1903. *Thinnfeldia? reticulata,* from Triassic rocks in York Co., is briefly discussed in a review of the group.
2. [Charles] David White [1862-1935]: Am. Jour. Sci. 5th ser., v. 29, p. 390-391, 1935.

BERTRAND, JOHN, *see* Montgomery, A., 1.

BERTRAND, PAUL

1. Les flores houillères d'Amerique d'apres les travaux de M. David White: Soc. géol. Nord Annales, v. 58, p. 231-254, Lille, 1933. The floral zones established by White in Pennsylvania and elsewhere in the United States are reviewed. The European flora-zone equivalents are compared to them.

BÉTHUNE, PIERRE F., de

1. La physiographie de l'est des États-Unis d'Amérique: Rev. Questions Scientifiques 4th ser., v. 22, p. 335-354, illus., Brussels, 1932. A generalized review of the physiographic development of the eastern United States includes the Commonwealth. No new data are included.
2. Het appalachisch relief in Pennsylvanië en de Ardennen: Natuurwet. Tydschr., v. 30, p. 55-64, Ghent, 1948. [not seen]

BEVAN, ARTHUR CHARLES

1. William Barton Rogers, first state geologist of Virginia (1835-1841): Va. Acad. Sci. Proc. 1934-35, p. 63-67 [1935].
2. William Barton Rogers [1804-1882], pioneer American scientist: Sci. Monthly, v. 50, p. 110-124, illus., 1940.

BIBBINS, ARTHUR BARNEVELD

1. (and Beck, H. H.). Prospects for oil and gas in Lancaster and Chester Counties, Pennsylvania. iv. 22 p., Lancaster, Farmers Oil Company, Inc., n.d. [192-]. Oil seeps near Lyndell, Chester Co., and Leaman Place, Lancaster Co., are described. That at Lyndell is in Cambrian sandstone, near Brandywine Creek. The structure is interpreted as a shattered, sealed monocline and syncline. The seep at Leaman Place is in a water well in [Ordovician] limestone. The oil presumably is coming from the underlying Cambrian quartzite. Igneous-invaded graphitic rocks may be the origin. [It analyzes like refined, pipeline product].

BILLINGS, MARLAND PRATT

1. Reginald [Aldworth] Daly, 1871-1957: Geotimes, v. 2, no. 11, p. 10, 1958.
2. Reginald A[ldworth] Daly, geologist [1871-1957]: Science, v. 127, p. 19-20, 1958.
3. Memorial to Reginald Aldworth Daly (1871-1957): Geol. Soc. America Proc. 1958, p. 115-121, port., 1959.

BILLINGSLEY, PAUL RAYMOND

1. The Shawangunk Grit, its structure, origin, and stratigraphic significance. M. A. thesis, Columbia Univ., 1911.

BLACKWELDER, ELIOT, 1880-

1. Regional Geology of the United States of North America, *in* G. Steinmann and O. Wilckens, eds., Handbuch der regionalen Geologie, Bd. 8, abt. 2 (Heft 11), 258 p., illus., Heidelberg, C. Winter's . . . , New York, C. S. Stechert, 1912; also with title, Regional geology of the United States of North America. 258 p., Heidelberg, C. Winter, [1912]. A cursory description of the geology of the United States includes the Commonwealth.

BLAKE, WILLIAM PHIPPS, 1826-1910, *see also* Marcou, J., 1.

1. Mineralogical notices: Am. Jour. Sci. 2d ser., v. 13, p. 116-117, v. 14, p. 105, 1852. A list of minerals from the Wheatley Mine, near Phoenixville, Chester Co., is given. Only a few data are included on argentiferons galena and chalcotrichite. Nickellite from Lancaster Co. is described.

BLAYLOCK, DANIEL W.

1. (and others). Estimate of known recoverable reserves of coking coal in Clearfield County, Pa.: U. S. Bur. Mines Rept. Inv. 5166, vi, 36 p., illus., 1955. Over 1,900 million short tons of coal remain. The Lower Freeport and Lower Kittanning coals are the most important beds. Some analyses are included.

2. (and others). Estimate of known recoverable reserves of coking coal in Clarion County, Pa.: U. S. Bur. Mines Rept. Inv. 5231, vi, 27 p., illus., 1956. Over 1,210 million short tons of coal remain in the ground. The Lower Kittanning and Clarion coals are the most important sources. Some analyses are included.

BLOCK, C. F.

1. (and Block, L. H.). William Morris Davis [1850-1934]: Am. Meteorol. Soc. Bull., v. 15, p. 56-61, 1934.

BLOCK, LYLYAN H., *see* Block, C. F., 1.

BLYTH, J. D. M.

1. Prof. W[illiam] H[erbert] Hobbs [1864-1953]: Nature, v. 171, p. 416-417, London, 1953.

BOAL, WILLIAM H., *see* Lesley, J. P., 5.

BOARDMAN, LEONA, *see also* Mansfield, G. R., 1.

1. Geologic map index of Pennsylvania: U. S. Geol. Survey Index Geol. Mapping U. S. Scale, 1:500,000 (about 1 inch to 8 miles), 1952.

BOCK, WILHELM, *see also* Huene, F. von, 2.

1. New eastern Triassic ginkgos: Wagner Free Inst. Sci. Bull., v. 27, p. 9-14, illus., 1952. *Eoginkoites sectoralis,* from Triassic rocks near Carversville, Bucks Co., is described and illustrated. It is considered Middle Keuper in age.
2. Triassic reptilian tracks and trends of locomotive evolution, with remarks on correlation [southeastern Pa.]: Jour. Paleontology, v. 26, p. 395-433, illus., 1952. Discussion is made of the relation of the mechanical principles of quadripedal locomotion to fossil reptile tracks. Examples from the Commonwealth are used. New reptilian tracks are described. The rocks are correlated with the equivalent European formations, comprising almost the whole Middle Keuper.
3. Vertex monocline studies of the Triassic of southeastern Pennsylvania: Pa. Acad. Sci. Proc., v. 26, p. 93-103, illus., 1952. Numerous dip measurements show that there was considerable penecontemporaneous settling of the Triassic basin with sedimentation. A vertex monocline is a sedimentary structure which forms a prism of acute triangular cross section, in which the beds are not parallel but converge sourceward toward a vertex. Detailed examples and analyses are included.
4. American Triassic estherids: Jour. Paleontology, v. 27, p. 62-76, illus., 1953; correction, p. 759, 1953. A review of the problems of branchiopod classification is followed by descriptions of Conchostraca from Chester, Montgomery, York, and Bucks Counties.
5. Secrets of the Coelocanths: Frontiers, v. 17, p. 99-103, illus., 1953. A popular account of this group of fish includes brief descriptions and illustrations of some of those from the Triassic rocks of southeastern Pennsylvania.
6. New eastern American Triassic fishes and Triassic correlations: Acad. Nat. Sci. Philadelphia Geol. Center Research Ser., v. 1, 184 p., illus., Lansdale, Pa., Launchman Printing Co., 1959. Seven species of fish from near Gwynned, in Montgomery Co., and six from Bucks Co., are extensively described and illustrated. All are from the Lockatong argillite. The Lockatong Formation (as he calls it), or age, is recognized on the basis of the fauna, and not lithology, as the black argillite gives way to red shale and sandstone laterally. The concept of facies in the Triassic rocks is discussed and discarded in favor of vertex monoclinal deposition.
7. The Edison fault [Bucks Co.] and the paleontology of some Lockatong beds: Pa. Acad. Sci. Proc., v. 33, p. 156-161, illus., 1959. A new fault, of uncertain nature, has exposed beds of the Lockatong Formation. Branchiopods and fish fragments are present. *Rabdiolepis gwynnedensis,* from the Gwynned tunnel, is described and illustrated. The family Turseoidae is erected from well-preserved fragments of *Turseodus acutus.*
8. The ground water picture of the Triassic of southeastern Pennsylvania: Pa. Acad. Sci. Proc., v. 33, p. 162-184, illus., 1959. The water-bearing properties of the various Triassic formations in Bucks and Montgomery Cos. are described.

BODE, HANS

1. Die floristische Gleiderung des Oberkarbons der Vereinigten Staaten von

Nordamerika: Deutsche geol. Gesell. Zeitschr., v. 110, p. 217-259, illus., Hannover, 1958. Pennsylvanian floral zones are described; the rocks of the Commonwealth are included. The floral sequences are similar to those in Europe. The Pennsylvanian-Permian boundaries are slightly different, however.

BOEHM, W., *see* Mazarovich, A. N., 1.

BOLGER, ROBERT COURTNEY, *see also* Weitz, J. H., 1.

1. Differential thermal analysis of some Mercer fire clays from north-central Pennsylvania: Pa. Acad. Sci. Proc., v. 26, p. 66-70, illus., 1952. D-T-A curves of typical examples of the Mercer clay are given. Kaolinite, diaspore, boehmite, and siderite are shown to be present.
2. (and Weitz, J. H.). Mineralogy and origin of the Mercer fireclay of north-central Pennsylvania, *in* Problems of clay and laterite genesis, p. 81-93, illus., New York, Am. Inst. Min. and Metall. Engineers, 1952. Petrographic studies and field relations indicate that the high-alumina clay was from a colloidal, gelatinous mixture of hydrous aluminum silcates and aluminum hydroxides which concentrated in swamps and later were crystallized to kaolinite, diaspore, and boehmite. Post-depositional changes concentrated the alumina.
3. Preliminary report, geologic structure of parts of the Chestnut Ridge and Driftwood anticlines in Clearfield and Elk Counties, Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 142, map with text, scale 1:62,500 (about 1 inch to 1 mile), 1953. A structure-contour map on the base of the Mercer Formation shows the structures. Well-sites are shown. The data are tabulated. Natural gas is present.
4. Subsurface structure of the Driftwood-Benezette gas field [Cameron, Elk Cos.]: Pa. Dept. Internal Affairs Monthly Bull., v. 22, no. 1, p. 15-18, illus., 1953. A structure-contour sketch map shows that the field is located on a dome on the Driftwood Anticline. Numerous faults occur in Cameron Co. Most of the wells are on the northeastern flank, and gas production is from the Oriskany Sandstone.
5. (and Gouse, H. V.). Surface and subsurface structure of the Driftwood Quadrangle [Cameron, Elk, Potter Cos.], Pennsylvania: Pa. Geol. Survey 4th ser., Bull. M 36, v, 32 p., illus., 1953. Devonian-Pennsylvanian rocks are cursorily described. The surface and subsurface structures are outlined; they are anticlines, synclines, and domes. The gas resources are described.
6. (and Prouty, C. E.). Upper Devonian and Mississippian stratigraphy of Cameron County, Pennsylvania: Pa. Acad. Sci. Proc., v. 27, p. 125-129, 1953. The Devonian-Mississippian section is described, and the fossils are listed. The fossil suite in the Patton Formation of the Pocono Group, appears to be Upper Devonian in age. The alternative explanations are discussed. Part of the Pocono Formation must be Devonian or the ranges of the guide fossils must be extended upward into the Mississippian System.
7. Uranium in Pennsylvania? . . . : Pa. Dept. Internal Affairs Monthly Bull., v. 23, no. 7, p. 28-30, 1955. A brief review of the occurrence of uranium mineralization in Carbon Co. and elsewhere is given. None is of commercial importance.

BONDARENKO, B.

1. William Morris Davis (1850-1934): Zemlevedenie, v. 36, p. 194-200, port., Moscow, 1934.

BONINE, CHESLEIGH ARTHUR

1. Pennsylvania—pioneer oil state: Compass, v. 23, p. 83-94, illus., 1943. This is an account of the early development of the petroleum industry in the Commonwealth.

BOONE, W. J., JR.

1. Helium-bearing natural gases of the United States, analyses and analytical methods, supplement to Bulletin 486: U. S. Bur. Mines Bull. 576, iii, 117 p., illus., 1958. Natural gases from many parts of western Pennsylvania are analyzed. Some contain a small amount of helium.

BOWEN, ELI

1. Off-hand sketches—a companion for the tourist and traveller over the Philadelphia, Pottsville, and Reading Railroad . . . . 194 p., illus., Philadelphia, J. W. Moore, 1854. This is a guidebook for railroad passengers, describing

the geology and historical sites along the route from Philadelphia to Pottsville.

2. The pictorial sketch book of Pennsylvania . . . 8th ed., 207 p., illus., Philadelphia, W. White Smith, 1854. Illustrations and descriptions of geological and cultural features along the line of the railroad from Philadelphia to Pottsville are given. No new data are included. Much detail of the anthracite regions is included.

BOWEN, NORMAN LEVI, 1887-1956, *see also* Wycoff, R. W. G., 1.

1. Memorial to Rollin Thomas Chamberlin [1881-1948]: Geol. Soc. America Proc. 1948, p. 135-143, port., 1949.

BOWLES, OLIVER

1. The stone industries. 1st ed., xi, 519 p., illus.. New York, McGraw-Hill Book Co., 1934; 2d ed., 519 p., 1939. The general principles of stone occurrence and use are discussed. A brief outline of the occurrences in each state, of different types of stone, includes the Commonwealth.

BOWMAN, ISAIAH, 1878-1950.

1. Forest physiography—physiography of the United States and principles of soils in relation to forestry. 750 p., illus., New York, J. Wiley and Sons, 1911. A cursory discussion of physiographic subdivisions includes the Commonwealth.
2. William Morris Davis [1850-1934]: Geog. Review, v. 24, p. 177-181, port., 1934; Soc. geog. nac. Madrid Bol., v. 74, p. 280-286, 1934.

BOWNOCKER, JOHN ADAMS, 1865-1928.

1. Our decreasing natural gas supply [abs.]: Science, v. 51, p. 518-519, 1920.

BOYD, JOHN A.

1. Geology of a portion of the Reading Prong in southeastern Berks County, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1956.

BOYÉ, MARTIN HANS, 1812-1909.

1. [Cobalt-bearing hematite, Huntingdon Co.] [abs.]: Am. Phil. Soc. Proc., v. 4, p. 238-239, 1847.
2. [Minerals from western Pennsylvania] [abs.]: Am. Phil. Soc. Proc., v. 4, p. 247, 1847.

BRADLEY, FRANK HOWE, 1838-1879.

1. Geological chart [map] of the United States east of the Rocky Mountains and of Canada, compiled in 1875. No scale, 16 x 24 inches, New York, 1876; text with title. On a geological chart of the United States east of the Rocky Mountains and of Canada: Am. Jour. Sci. 3d ser., v. 12, p. 286-291, 1876.

BRANSON, CARL COLTON

1. Memorial to Charles Elijah Decker (1868-1958): Geol. Soc. America Proc. 1958, p. 123-126, port., 1959.

BRANSON, EDWIN BAYER, 1877-1950.

1. Structure and relationships of American Labyrinthodontida: Jour. Geology, v. 13, p. 568-610, illus., 1905. *Eupelor durus,* from Triassic rocks in Chester and York Counties, is discussed.

BRAUN, EMMA LUCY, *see* Denny, C. S., 1.

BRESTON, J. N., *see* Johnson, W. E., 1.

BREWER, CHARLES, JR., 1900-1944.

1. Development of subsurface methods, *in* Symposium on geological prospecting for oil and gas in the Appalachian area: W. Va. Univ. Bull. 45, no. 3-II, p. 135-138, 1944. An historical review includes the fact that J. F. Carll, of the Second Survey, in some of his oil district reports, used subsurface techniques.

BREZINA, ARISTIDES

1. Die Meteoritensammlung des . . . Hofmuseums . . . : K. K. Naturhistorisches Hofmus. Annalen, v. 10, p. 231-370, illus., Vienna, 1896. A general description of the meteorite collection includes localities of new additions. A classification based upon mineral composition is given; the Mount Joy, Adams Co., meteorite is discussed and included in the Breccianaehliche Hexahedrites. The Millers Run, Allegheny Co., stone is a Normale Hexahedrite.

BRICKER, OWEN PETER, JR.

1. (and Moss, J. H.). Origin of The Marsh, East Nantmeal Township, Chester County, Pennsylvania: Pa. Acad. Sci. Proc., v. 32, p. 168-171, illus., 1958. A

quartz-monzonite ridge has created a temporary base level, causing Marsh Creek to back up behind it; a swamp has resulted. A tundra pollen flora shows that it was existent during the Pleistocene Epoch.

BRIGGS, LOUIS ISAAC, JR., *see* Alling, H. L., 1.

BRILL, KENNETH GRAY, JR., *see* Nelson, J. M., 1.

BRINDLEY, GEORGE WILLIAM

1. (and Ogilvie, G. J.). The texture of single crystals of brucite [Lancaster Co.]: Acta Crystallographica, v. 5, p. 412-413, illus., Copenhagen, 1952. X-ray analyses of crystals from the Wood Mine are given. There is no irregularity in the stacking sequence. The optic C axis varies from the morphologic C axis, but there is no rotation of the A axis about the C axis.

BRITTON, NATHANIEL LORD

1. [Triassic plant from Bucks Co. and a clam from Chester Co.] [abs.]: N. Y. Acad. Sci. Trans., v. 5, p. 17, 1885-1886.
2. John Strong Newberry [1822-1892]: Torrey Bot. Club Bull., v. 20, p. 89-98, port., 1893.

BROMERY, RANDOLPH WILSON

1. (and Bennett, B. L., and others). Aeromagnetic map of the Allentown Quadrangle, Northampton, Lehigh, and Bucks Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-213. Scale 1:24,000 (1 inch to 2000 feet), 1959.
2. (and Henderson, J. R., and Zandle, G. L., and others). Aeromagnetic map of the Buckingham Quadrangle, Bucks County, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-215. Scale 1:24,000 (1 inch to 2000 feet), 1959.
3. (and Zandle, G. L., and others). Aeromagnetic map of the Conestoga Quadrangle, Lancaster County, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-218. Scale 1:24,000 (1 inch to 2000 feet), 1959.
4. (and Zandle, G. L., and others). Aeromagnetic map of the East Greenville Quadrangle, Berks, Lehigh, and Montgomery Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-205. Scale 1:24,000 (1 inch to 2000 feet), 1959.
5. (and Henderson, J. R., and Zandle, G. L., and others). Aeromagnetic map of the Elverson Quadrangle, Berks and Chester Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-221. Scale 1:24,000 (1 inch to 2000 feet), 1959.
6. (and Henderson, J. R., and Bennett, B. L., and others). Aeromagnetic map of parts of the Lambertville and Stockton Quadrangles, Bucks County, Pennsylvania . . . : U. S. Geol. Survey Geophys. Inv. Map GP-216. Scale 1:24,000 (1 inch to 2000 feet), 1959.
7. (and Bennett, B. L., and others). Aeromagnetic map of the Malvern Quadrangle, Chester County, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-202. Scale 1:24,000 (1 inch to 2000 feet), 1959.
8. (and Zandle, G. L., and others). Aeromagnetic map of part of the Media Quadrangle, Chester and Delaware Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-204. Scale 1:24,000 (1 inch to 2000 feet), 1959.
9. (and Zandle, G. L., and others). Aeromagnetic map of the Milford Square Quadrangle, Bucks, Lehigh, and Montgomery Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-206. Scale 1:24,000 (1 inch to 2000 feet), 1959.
10. (and Zandle, G. L., and others). Aeromagnetic map of the Morgantown Quadrangle, Berks, Lancaster, and Chester Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-220. Scale 1:24,000 (1 inch to 2000 feet), 1959.
11. (and Zandle, G. L., and others). Aeromagnetic map of part of the Norristown Quadrangle, Philadelphia, Chester, Delaware, and Montgomery Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-201. Scale 1:24,000 (1 inch to 2000 feet), 1959.
12. (and Zandle, G. L., and others). Aeromagnetic map of the Perkiomenville Quadrangle, Montgomery and Bucks Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-208. Scale 1:24,000 (1 inch to 2000 feet), 1959.
13. (and Bennett, B. L., and others). Aeromagnetic map of the Phoenixville

Quadrangle, Chester and Montgomery Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-209. Scale 1:24,000 (1 inch to 2000 feet), 1959.

14. (and Zandle, G. L., and others). Aeromagnetic map of the Quakertown Quadrangle, Bucks County, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-214. Scale 1:24,000 (1 inch to 2000 feet), 1959.
15. (and Zandle, G. L., and others). Aeromagnetic map of the Quarryville Quadrangle, Lancaster County, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-219. Scale 1:24,000 (1 inch to 2000 feet), 1959.
16. (and Zandle, G. L., and others). Aeromagnetic map of the Safe Harbor Quadrangle, Lancaster and York Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-217. Scale 1:24,000 (1 inch to 2000 feet), 1959.
17. (and Zandle, G. L., and others). Aeromagnetic map of the Sassamansville Quadrangle, Montgomery and Berks Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-207. Scale 1:24,000 (1 inch to 2000 feet), 1959.
18. (and Zandle, G. L., and others). Aeromagnetic map of the Valley Forge Quadrangle, Chester, Montgomery, and Delaware Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-200. Scale 1:24,000 (1 inch to 2000 feet), 1959.
19. (and Zandle, G. L., and others). Aeromagnetic map of part of the West Chester Quadrangle, Chester and Delaware Counties, Pennsylvania: U. S. Geol. Survey Geophys. Inv. Map GP-203. Scale 1:24,000 (1 inch to 2000 feet), 1959.
20. Interpretation of aeromagnetic data across the Reading Prong, Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1574-1575, 1959.

BROOKS, ALFRED HULSE, 1871-1924.

1. Memorial of Charles Willard Hayes [1858-1916]: Geol. Soc. America Bull., v. 28, p. 81-123, port., 1917.

BROSCOE, ANDY JOE

1. Asymmetrically located longitudinal subsequent streams in the Ridge and Valley Province of western Virginia and southern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 61, p. 1446, 1950.
2. Quantitative analysis of longitudinal stream profiles of small watersheds [Cameron, Potter Cos.]: Columbia Univ. Dept. Geology Tech. Rept. 18, viii, 73 p., illus., 1959. Salt Run, near Emporium, is used as an example, along with other streams from elsewhere, for statistical evaluations of long profiles. Each curve is segmented, each segment corresponding to a different order. Graphical and statistical tests show that each individual segment is concave-up but not necessarily best-fitted by any one equation. A composite profile having mean properties of segments of successive orders is best described by logarithmic equations. The mean altitude change for any order segment appears to be a constant, independent of order.

BROWN, ALBERT, *see* Landis, C., 2.

BROWN, IRA OTHO, *see* Schottenlocher, R., 1.

BROWN, ROLAND WILBUR

1. Nelson Horatio Darton [1865-1948]: Wash. Acad. Sci. Jour., v. 39, p. 114, 1949.

BROWN, SAMUEL BOARDMAN, 1860-1926.

1. The terraces along the Monongahela River: W. Va. Acad. Sci. Proc., v. 1, (W. Va. Univ. Bull., ser. 27, no. 1), p. 46-47, 1926. The northward-flowing river flows roughly along the regional northward strike of the formations; the dips are predominantly toward the west. Therefore, the river cuts steep banks on the western side. Several stages of uplift have resulted in terraces on the eastern side.

BROWN, WILLIAM B., 3d

1. Pinchout pays in Pennsylvania: Producers Monthly, v. 24, no. 1, p. 30, 1959. Examples of "pinchout" stratigraphic traps are discussed. Descriptions of the Boone Mountain and Rockton-Benezette trends in Elk and Clearfield Cos. are included.

BRUMMER, JOHANNES J.

1. Supergene copper-uranium deposits in northern Nova Scotia: Econ. Geology, v. 53, p. 309-324, illus., 1958; discussion by J. F. McCauley, p. 1038-1042, illus., 1958; with title, Copper-uranium deposits in Pennsylvania, by E. H. S.

Gaucher, v. 54, p. 1126, 1959. The discussions involve the northcentral Commonwealth. A complex suite of uranium-associated sulphides is present in the Catskill Formation. Experiments show that a supergene or syngenetic origin for the sulphides is untenable. They must be primary.

BRUSH, GEORGE JARVIS, 1831-1912.

1. On the crystalline form of the hydrate of magnesia from Texas in [Lancaster Co.] Pennsylvania: Am. Jour. Sci. 2d ser., v. 32, p. 94-95, 1861. The texalite, reported by Hermann in 1861, is rhombohedral brucite.
2. Vermiculite? [Chester Co.], *in* Ninth supplement to Dana's Mineralogy: Am. Jour. Sci. 2d ser., v. 31, p. 354-371, 1861. A previously-suspected phlogopite is described in detail and is considered to be vermiculite. It expands considerably when heated.

BRUSH, LUCIEN MUNSON, JR.

1. Drainage basins, channels, and flow characteristics of streams in central Pennsylvania. Ph.D. thesis, Harvard Univ., 1956.
2. Effect of bedrock on characteristics of headwater streams in central Pennsylvania [abs.]: Geol. Soc. America Bull., v. 67, p. 1676-1677, 1956.

BRYAN, WILLIAM ALANSON, 1875-1942.

1. Roy Lee Moodie [1880-1934]: Science, v. 79, p. 263, 1934.

BUCHER, WALTER HERMANN

1. Memorial to John L[yon] Rich (1884-1956): Geol. Soc. America Proc. 1958, p. 183-190, port., 1959.

BUCKWALTER, JOHN F.

1. How much oil will Bradford [oil field, McKean Co.] produce after January 1, 1953 [?]: Producers Monthly, v. 17, no. 12, p. 22-23, 1953. Over 170,000,000 barrels of oil are estimated to be still in reserve.

BUCKWALTER, TRACY VERE, JR.

1. Origin and field relations of the Pochuck gneiss in Lebanon, Berks, and Lancaster Counties, Pennsylvania: Pa. Acad. Sci. Proc., v. 27, p. 114-119, illus., 1953. All of the Precambrian formations are described. The Pochuck Formation has two members, a gabbro and a hornblende gneiss. The gneiss overlies and is gradational with the Franklin graphitic gneiss. The hornblende gneiss member is, in part, sedimentary in origin. The gabbro members of the Pochuck is igneous in origin. The Pochuck Formation is intruded by Byram Gneiss.
2. Mica prospects—a report on eastern Berks County: Pa. Dept. Internal Affairs Monthly Bull., v. 22, no. 2, p. 17-20, illus., 1954. Biotite, in 6-7 inch long books, 4-5 inches thick, occurs in several closely-spaced pegmatite dikes in Earl Township. Small books of muscovite are described from District Township. Other minor locations are mentioned and shown on a map.
3. The lithology, stratigraphic relations and structure of pre-Cambrian rocks in [south] eastern Pennsylvania, *in* Field guidebook of Appalachian geology, Pittsburgh to New York, Mar. 1955, p. 93-97, Pittsburgh Geol. Soc., 1955. A generalized resumé of the rocks along a field trip route is given.
4. A post-Hardyston pre-Triassic diabase dike in Berks County, Pennsylvania: Pa. Acad. Sci. Proc., v. 30, p. 170-175, illus., 1956. A highly-altered diabase dike is described petrographically. Its stratigraphic position and its similarity to nearby Ordovician volcanic rocks suggest an Ordovician age.
5. Granitization in the Reading Hills, Berks County, Pennsylvania: Pa. Acad. Sci. Proc., v. 32, p. 133-138, illus., 1958. Nearly-similarly-oriented xenoliths of hornblende gneiss in granite gneiss and in granite pegmatite suggest that the granite gneiss was granitized in place. The orientation of the foliation in the xenoliths conforms to that of other nearby crystalline rocks.
6. Geology of the Precambrian rocks and Hardyston formation of the Boyertown Quadrangle [Berks Co.]: Pa. Geol. Survey 4th ser., Geol. Atlas 197, [15 p.], geol. map, 1959. The Franklin Marble, lime-silicate gneiss, graphitic gneiss, Pochuck Gneiss, Byram Gneiss, and quartz-diorite gneiss, all Precambrian in age and the Hardyston Formation of Cambrian age, are described in detail. Other Cambrian, Ordovician, and Triassic rocks are cursorily described. A geological map is included.

BURCHARD, ERNEST FRANCIS

1. Memorial to William Clifton Phalen [1877-1949]: Geol. Soc. America Proc. 1949, p. 213-216, port., 1950.

BURKE, J. J.

1. New marine horizon in the Conemaugh Formation [Armstrong Co.]: Science, v. 128, p. 302, 1958. The Carnahan Run Shale [Member] is proposed for newly identified fossiliferous beds. It overlies the Woods Run Limestone [Member]. The Nadine Limestone [Member] is named below the Woods Run [Member]. Sections are described; fossils are listed.

BURNS, ROBERT E.

1. Geology along Monacacy Creek of Bethlehem [Northampton Co.], Pennsylvania. M. S. thesis, Lehigh Univ., 1950.

BURTNER, ROGER

1. (and Weaver, R., and Wise, D. U.). Structure and stratigraphy of Kittatinny Ridge at Schuylkill Gap, [Berks, Schuylkill Cos.], Pennsylvania: Pa. Acad. Sci. Proc., v. 32, p. 141-145, illus., 1958. Detailed measurements reveal a major fault which repeats over 500 feet of slightly different facies of the Silurian Clinton Formation. Minor structures are also described.

BUTTS, CHARLES, 1863-1946.

1. Geologic section of Blair and Huntingdon counties, central Pennsylvania: Am. Jour. Sci. 4th ser., v. 46, p. 523-537, illus., 1918.

BUWALDA, JOHN PETER, 1886-1954.

1. A tribute to William Morris Davis [1850-1934]: Science, v. 80, p. 46, 1934.
2. William Morris Davis [1850-1934], an appreciation: Sci. Monthly, v. 38, p. 384-387, port., 1934.

CAMPBELL, IAN

1. John Peter Buwalda (1886-1954): Am. Assoc. Petroleum Geologists Bull., v. 39, p. 141-144, port., 1955.
2. (and Sharp, R. P.). Memorial to John Peter Buwalda (1886-1954): Geol. Soc. America Proc. 1955, p. 107-112, port., 1956.

CAMPBELL, MARIUS ROBINSON, 1858-1940, *see also* Clark, W. B., 3; Parker, E. W., 1.

1. Hypothesis to account for the extra-glacial abandoned valleys of the Ohio basin [southwestern Pa.] [abs.]: Geol. Soc. America Bull., v. 12, p. 462, 1902; Science, v. 13, p. 98-99, 1901.
2. Hypothesis to account for the transformation of vegetable matter into the different grades of coal: Econ. Geology, v. 1, p. 26-33, 1905. Examples are taken from the Commonwealth and elsewhere to show that the various ranks of coal are due to fractional distillation of vegetable matter by heat. The origin of the heat from pressure and other minor factors is discussed.
3. Historical review of theories advanced by American geologists to account for the origin and accumulation of oil: Econ. Geology, v. 6, p. 363-395, 812, 1911. An historical survey includes the work of many Pennsylvania geologists.
4. Miscellaneous analyses of coal samples from various fields of the United States: U. S. Geol. Survey Bull. 471, p. 629-655, 1912. Bituminous coal from Somerset Co. and semi-anthracite coal from Sullivan Co. are included in the analyses.
5. Miscellaneous analyses of coal samples from various fields of the United States: U. S. Geol. Survey Bull. 531, p. 331-355, 1913. A sample of the Pittsburgh coal from Washington Co. is included among the analyses.
6. Analyses of coal samples from various fields in the United States: U. S. Geol. Survey Bull. 541, p. 491-526, 1914. Analyses of bituminous coal from many parts of the Commonwealth are included.
7. (and Clark, F. R.). Analyses of coal samples from various parts of the United States: U. S. Geol. Survey Bull. 621, p. 251-370, 1916. Analyses of coals from Somerset Co. are included.
8. David Talbot Day [1859-1925]: Am. Inst. Min. and Metall. Engineers Trans., v. 71, p. 1371-1373, port., 1925; Mining and Metallurgy, v. 6, p. 302-304, port., 1925.
9. Geomorphic values of river gravel [southeastern Pa.]: Geol. Soc. America Bull., v. 40, p. 515-532, 1929. The theory that gravels can be used for geomorphic correlations is tested with the gravel deposits along the Susquehanna River. The elevation of the gravel increases from the mouth of the

river up to a certain elevation and then decreases from this point to Harrisburg. He concludes that the gravel-covered surface was warped.

CAMPBELL, WILLIAM

1. (and Knight, C. W.). Microscopic examination of nickeliferous pyrrhotites: Eng. Min. Jour., v. 82, p. 909-912, illus., 1906. Ores from the Gap Mine, Lancaster Co., and elsewhere are examined metallographically. All seem to have a common origin, i.e., basic rocks were shattered, pyrrhotite solutions replaced the rock matter, the pyrrhotite was later shattered, and deposition of pentlandite and chalcopyrite then followed.
2. (and Knight, C. W.). On the microstructure of nickeliferous pyrrhotites [Lancaster Co.]: Econ. Geology, v. 2, p. 350-366, illus., 1907. Detailed metallographic studies of pyrrhotite ore bodies, including that from the Gap Mine, show that the ore is in three sulphides which occur in the order pyrrhotite, pentlandite, and chalcopyrite. The latter two have a common habit. Magnetite is the oldest rock constituent present, with the silicate minerals next. The sulphides fill cracks in the fractured silicates.

CAPE, EMILY PALMER

1. Lester F[rank] Ward [1841-1913]—a personal sketch. xi, 208 p., illus. incl. port., New York, G. P. Putnam's Sons, 1922.

CARLL, JOHN FRANKLIN, 1828-1904.

1. Report of progress in the Venango [Venango Co.] district: Pa. Geol. Survey 2d, I, p. 1-49, illus., 1875. The genesis, source, and occurrence of petroleum in the area are described. Oil sands are in the [Mississippian] and [Devonian] rocks. Generalized stratigraphic sections are given.

CARLSTON, CHARLES WILLIAM

1. Origin of transverse drainage of the North Atlantic slope [eastern Pa.] [abs.]: Geol. Soc. America Bull., v. 61, p. 1449, 1950.
2. Character of the pre-Wisconsin valley of the Upper Ohio River [western Pa.] [abs.]: Geol. Soc. America Bull., v. 68, p. 1706, 1957.

CARPENTER, GEORGE W.

1. On the mineralogy of Chester County with an account of some of the minerals of Delaware, Maryland, and other localities. 16 p., [n.p.] 1828; reprinted *from* Am. Jour. Sci., v. 14, p. 1-14, 1828.
2. On the mineralogy of Chester County, with an account of some of the minerals of Delaware, Maryland, and other localities. 19 p., appendix *in* Essays on some of the most important articles of the Materia Medica . . . . Philadelphia, Geo. W. Carpenters Chemical Warehouse, 1831. Descriptions and discussions of many different minerals are given. Emphasis is placed upon potential medicinal use. Each township is considered separately. Some references to locations in Bucks and Philadelphia Cos. are included.

CARR, MARTHA ENSIGN STRAIT

1. (and Dutton, C. E.). Iron-ore resources of the United States including Alaska and Puerto Rico, 1955: U. S. Geol. Survey Bull. 1082-C, p. iv, 61-134, illus., 1959. The mineralogy and geology of the Cornwall iron deposit in Lebanon Co. are included in a review.

CASE, ERMINE COWLES, 1871-1953.

1. A revision of the Cotylosauria of North America: Carnegie Inst. Washington Pub. 145, 122 p., illus., 1911. *Desmatodon hollandi* from Permian rocks of Allegheny Co. is described and illustrated.
2. The Permo-Carboniferous red beds of North America and their vertebrate fauna: Carnegie Inst. Washington Pub. 207, 176 p., illus., 1915. A survey of the formations and the reptilian-amphibian fauna includes those of the Commonwealth. Paleoecology is discussed in detail.

CASTER, KENNETH EDWARD

1. The stratigraphy and paleontology of northwestern Pennsylvania—Part 1, Stratigraphy: Bulls. Am. Paleontology, v. 21, no. 71, 185 p., illus., 1934; discussion by G. H. Chadwick, Geol. Soc. America Bull., v. 46, p. 340-341, 1935. The Upper Devonian and Mississippian rocks are described. Sections are measured; correlations are made. The facies concept is important in this work. The classification of Catskill delta rocks is reconsidered in the light of facies concepts which are new. The faunas are listed.

2. A restudy of the tracks of *Paramphibius* [Susquehanna Co.]: Jour. Paleontology, v. 12, p. 3-60, illus., 1938. *Paramphibius* tracks were made by a crustacean, not an amphibian. Other closely related limulids are discussed. The rocks are marine. There are, therefore, no amphibians in the Devonian rocks of the United States. Willard (1935) originally discussed this form and called it the first amphibian in the Devonian of the United States.
3. The Titusvilliidae—Paleozoic and Recent branching Hexactinellida: Palaeontographica Americana, v. 2, no. 12, 52 p., illus., 1941. A monograph on the group includes descriptions and illustrations of *Titusvillia drakei* from Devonian rocks in Crawford and Warren Cos. and *Armstrongia aryx* and *A. clarkei* from (?) Devonian rocks in Erie Co. Relationships to living types are discussed, and environmental interpretations are made.
4. Titusvilliidae—useful stratigraphic indices [northwest Pa.] [abs.]: Geol. Soc. America Bull., v. 52, p. 1962, 1941.

CASWELL, ALEXIS

1. Memoir of Benjamin Silliman, Sr., 1779-1864: Natl. Acad. Sci. Biog. Mem., v. 1, p. 99-112, 1877.

CATE, ADDISON SMITH, *see also* Jones, T. H., 2; Lytle, W. S., 7, 9.

1. J. Peter Lesley [1819-1903]: GeoTimes, v. 4, no. 4, p. 18-19, 45, 1959.

CATHCART, STANLEY HOLMAN, 1889-1953, *see also* Ashley, G. H., 3.

1. Geologic structure of northwest Pennsylvania has deep sand possibilities of gas and oil: Oil and Gas Jour., v. 33, no. 31, p. 58-59, illus., 1934. A review of the structure and stratigraphy suggests that pre-Oriskany Sandstone formations may be potential oil reservoirs. A structure-contour map of the Corry Sandstone is included.
2. (and Fettke, C. R.). The status of exploration for oil and gas in Pennsylvania, *in* Prospects for discovery of oil and gas beyond proven areas and from deeper horizons in the Appalachian Basin: Am. Petroleum Inst. Div. Production Paper 826-20-C, 6 p., illus., [1949]. Descriptions of the stratigraphy, structure, and sedimentation features of the Appalachian productive areas are given. The Cambrian-Devonian rocks are described and the petroleum potential is described.
3. Gas in Leidy Township, Clinton County, Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 133, 15 p., illus., 1950. Natural gas from the Devonian Oriskany Sandstone is reported. A short historical sketch is followed by a general geological summary. No new data are included.
4. Ground-water problems in Pennsylvania [abs.]: Geol. Soc. America Bull., v. 62, p. 1548-1549, 1951.
5. Recent developments in exploration in northern and central Pennsylvania: Am. Petroleum Inst. Div. Production Paper 826-22-E, 6 p., illus., [1951]. This is a review of natural gas and petroleum production sources in the Commonwealth. No new data are included.
6. George Hall Ashley (1866-1951): Am. Assoc. Petroleum Geologists Bull., v. 36, p. 536-538, port., 1952; slightly revised, Pa. Dept. Internal Affairs Monthly Bull., v. 20, no. 6, p. 20-22, 1952.

CATLETT, CHARLES

1. Associates of serpentine from Easton [Northampton Co.], Pennsylvania, *in* [Part] 5, Serpentine and its associates, *in* Miscellaneous analyses: U. S. Geol. Survey Bull. 64, p. 44, 1890. A vermiculite is chemically analyzed.

CHADWICK, GEORGE HALCOTT, 1876-1953.

1. Chemung stratigraphy in western New York [and Erie Co.] [abs.]: Geol. Soc. America Bull., v. 34, p. 68-69, 1923.
2. The stratigraphy of the Chemung group in western New York: N. Y. State Mus. Bull. 251, p. 149-157, illus., 1924. The rocks of northwestern Pennsylvania are included in the discussion. The Chemung Formation is shown to be a time-transgressing unit adjacent to the Catskill Formation.
3. Chagrin formation of Ohio: Geol. Soc. America Bull., v. 36, p. 455-464, illus., 1925. The Upper Devonian section in northwestern Pennsylvania is compared to the same section in Ohio. The Bradfordian Series is considered to be latest Devonian.
4. [Title unknown]: Eastern States Oil and Gas Weekly, v. 1, no. 17, p. 7, 1932. [not seen] The type section of the Catawissa Reds is mentioned for the first time.

5. History and value of the name "Catskill" in geology: N. Y. State Mus. Bull. 307, 116 p., illus., 1936. An historical review of the usage of the name includes references to locations in the Commonwealth and to the publications about Pennsylvania. Fossils are listed.
6. Columnar limestone produced by sun-cracking [northeastern Pa.] [abs.]: Geol. Soc. America Bull., v. 51, p. 1923, 1940.

CHALONER, WILLIAM G.

1. Mississippian megaspores from Michigan and adjacent states: Mich. Univ. Mus. Paleontology Contrib., v. 12, p. 23-25, illus., 1954; correction, Micropaleontology, v. 2, p. 298, 1956. Spores occur in a black, carbonaceous shale in the upper part of the Pocono Group which is of Osage or possibly Kinderhook age. The exposure is in the Cape Horn railway cut in Pottsville Gap, in Schuylkill Co. *Triletis angulatus* is described and illustrated.

CHAMBERLIN, ROLLIN THOMAS, 1881-1948.

1. Memorial of Rollin D. Salisbury [1850-1922]: Geol. Soc. America Bull., v. 42, p. 126-138, port., 1931.
2. Biographical memoir of Thomas Chrowder Chamberlin, 1843-1928: Natl. Acad. Sci. Biog. Mem., v. 15, p. 305-407, ports., 1934.

CHAMBERLIN, THOMAS CHROWDER, 1843-1928.

1. The rock-scourings of the great ice invasions: U. S. Geol. Survey Ann. Rept., v. 7, p. 147-248, illus., 1888. A detailed account of scouring and striations, their appearances, and origins includes a map showing their distribution in the Commonwealth.
2. The diversity of the glacial period: Am. Jour. Sci. 3d ser., v. 45, p. 171-200, 1893. A discussion of Wright (1892) points out inconsistencies. Some examples are from the Commonwealth. The Delaware River Valley problems are specifically cited.
3. Map of North America during the great ice age. Scale, 104 miles per inch, Chicago, Rand McNally and Co., 1913.
4. Charles Richard Van Hise, 1857-1918: Jour. Geology, v. 26, p. 690-697, 1918.
5. Memorial editorial; Rollin D. Salisbury, August 17, 1858-August 15, 1922: Jour. Geology, v. 30, p. 480-481, 1922.
6. Biographical memoir, Charles Richard Van Hise, 1857-1918: Natl. Acad. Sci. Mem., v. 17, p. 143-151, port., 1924.
7. (and Moore, R. C.). Memorial of Stuart Weller [1870-1927]: Geol. Soc. America Bull., v. 39, p. 116-126, port., 1928.

CHAMBERLIN, W. A., *see* Wright, F. J., 1.

CHANNABASAPPA, KENKERE C.

1. An integrated study of petrographic, carbonization, and chemical properties of some bituminous coal seams from the Appalachian region. Ph.D. thesis, Pa. State Coll., 1954.

CHAPMAN, CARLTON ABRAMSON, *see* Sitler, R. F., 1.

CHAPMAN, RANDOLPH WALLACE

1. Contact-metamorphic effects of Triassic diabase at Safe Harbor [Lancaster Co.], Pennsylvania: Geol. Soc. America Bull., v. 61, p. 191-220, illus. incl. geol. map, 1950. Triassic diabase has invaded Cambrian dolomite and schist. The effects are completely described. Analyses are given.

CHASE, LEONARD R.

1. Secondary manganese deposits of Pennsylvania. M. S. thesis, Pa. State Coll., 1955.

CHAYES, FELIX, *see* Griffiths, J. C., 5.

CHESLEY, K. G., *see* Anderson, H. V., 1

CH'IH, CHI SANG

1. Structural petrology of the Wissahickon Schist near Philadelphia, [Philadelphia Co.] with special reference to granitization: Geol. Soc. America Bull., v. 61, p. 923-956, illus., 1950. Many petrographic analyses are made of granitized and ungranitized schist. Granitization was effected chiefly by the introduction of alkalies and some lime, probably carried in hydrothermal solutions. The effects of post-granitization movements are also described.

CHILCOTE, ROBERT H.

1. The relative relief of McKean County: Pa. Acad. Sci. Proc., v. 27. p. 143-145, illus., 1953. A very-small-scale map of the county is prepared from isopleths.

The points were determined by numbers representing local, relative relief for each 5-minute quadrangle in the county.

CHILDS, MARK S.

1. Geology and development at Friedensville [Lehigh Co.], Pa.: Mining Eng., v. 9, p. 56-60, illus., 1957. A review of the geology, ore occurrence, mining problems, and mining techniques is given. No new data are included.

CHOQUETTE, PHILIP W.

1. A petrographic study of the "State College" siliceous oolite [Centre Co.]: Jour. Geology, v. 63, p. 337-347, illus., 1955. Petrographic evidence from the Upper Cambrian oolite-bearing formation indicates that the rocks originally contained calcareous oolites. Postdepositional silicification, probably before tectonic uplift (?), resulted in the nearly complete replacement of the original carbonate.

CHOW, MINCHEN MING

1. The Pennsylvanian Mill Creek Limestone in [Luzerne Co.] Pennsylvania: Ph.D. thesis, Lehigh Univ., 1950; Pa. Geol. Survey 4th ser., Bull. G 26, iv, 36 p., illus., 1951. A brief description of the limestone is followed by an extensive discussion of the marine invertebrate fauna. More than fifty species have been recognized; none are new. Thirty-six are described and illustrated. The Mill Creek Limestone is correlated with the limestone in the Conemaugh Formation farther west.

CLAPP, FREDERICK GARDNER, 1879-1944.

1. The occurrence of petroleum, *in* Day, D. T., A handbook of the petroleum industry, v. 1, p. 1-166, illus., New York, Wiley and Sons, 1922. A general survey of the occurrence of petroleum includes many examples and illustrations from the Commonwealth. No new details are included.

CLARK, FRANK RINKER, *see also* Campbell, M. R., 7.

1. Horace Gardiner Richards, recipient of [A.A.P.G.] President's Award: Am. Assoc. Petroleum Geologists Bull., v. 30, p. 736-738, port., 1946.

CLARK, THOMAS HENRY

1. Charles Schuchert—1858-1942: Canadian Field-Naturalist, v. 57, p. 47-48, Ottawa, 1943.

CLARK, WILLIAM BULLOCK, 1860-1917.

1. Geology, *in* . . . The physical features of Maryland . . . : Md. Geol. Survey, v. 1, p. 153-204, illus., 1897. Mention is made of the type sections for the Juniata and Tuscarora Formations. No details of the type sections are included, however.
2. (and Martin, G. C.). Correlation of the formations and members [of the Pennsylvania System of Maryland]: Md. Geol. Survey, v. 5, p. 291-315, illus., 1905. Extensive correlations include the coal-bearing beds in the Commonwealth. Sections are measured and illustrated.
3. Origin, distribution, and uses of coal: Md. Geol. Survey, v. 5, p. 221-240, illus., 1905; review by M. R. Campbell, Econ. Geology, v. 1, p. 502-508, 1906. A general resumé includes information from the Commonwealth; no new data are included.

CLARKE, FRANK WIGGLESWORTH, 1847-1931.

1. Miscellaneous analyses *in* Report of work done in the division of chemistry and physics . . . : U. S. Geol. Survey Bull. 64, p. 40-60, 1890. The following are analyzed: vermiculite, tremolite, and "nephrite" from Northampton Co., and two clays from Northumberland Co.
2. (and Schneider, E. A.). Experiments upon the constitution of natural silicates: U. S. Geol. Survey Bull. 78, p. 11-33, 1891. In an otherwise purely chemical discussion, repidolite and jefferisite from Chester Co. are analyzed.
3. (and Schneider, E. A.). On the constitution of certain micas, vermiculites, and chlorites [Delaware, Chester Cos.]: U. S. Geol. Survey Bull. 90, p. 11-21, 1892; Am. Jour. Sci. 3d ser., v. 42, p. 242-251, 1891; Zeitschr. Kristallographie, v. 19, p. 465-477, Leipzig, 1891. Hallite from Chester Co. and vermiculite from Delaware Co. are analyzed and compared with other micaceous minerals.
4. Miscellaneous analyses, *in* Report of work done in the division of chemistry and physics . . . : U. S. Geol. Survey Bull. 90, p. 62-75, 1892. Sandstone from Dauphin Co. and limestone from Cumberland Co. are analyzed.

5. The Mount Joy [Adams Co.] meteorite, *in* Report of the work done in the division of chemistry . . . : U. S. Geol. Survey Bull. 113, p. 109, 1893. An analysis is listed.
6. Mineral analyses from the laboratories of the United States Geological Survey 1880 to 1903: U. S. Geol. Survey Bull. 220, ii, 119 p., 1903. Brucite from Lancaster Co., tremolite and phlogopite from Northampton Co., vermiculite, jefferisite, and hallite from Chester Co., lennilite and painterite from Delaware Co., clinochlore from Chester Co., and serpentine from Northampton Co. are analyzed.
7. Water analyses . . . : U. S. Geol. Survey Water-Supply Paper 364, 40 p., 1914. Water from a depth of 6300 feet, from a well in Washington Co., is analyzed.
8. (and Hillebrand, W. F.). Analyses of rocks . . . 1880 to 1896: U. S. Geol. Survey Bull. 148, ix, 306 p., 1897; 1880 to 1899: Bull. 168, 308 p., 1900; 1880 to 1903: Bull. 228, ii, 375 p., 1904; [and minerals] 1880 to 1908: Bull. 419, xii, 323 p., 1910; 1880 to 1914: Bull. 591, 376 p., 1915. In successive volumes the material has accumulated so that the last has all of the data. The following are analyzed: quartz-porphyry and aporhyolite from Franklin Co.; arkose-gneiss, mica gneiss, hornblende gneiss, and hypersthene gabbro from the Philadelphia area; sandstone from Dauphin Co.; limestone from Adams and Cumberland Cos.; dolomite from Cumberland Co.; slate from Lehigh and Berks Cos.; clay from Northumberland Co.; brucite from Lancaster Co.; vermiculite from Chester Co.; hallite from Chester Co.; lennillite from Delaware Co.; painterite from Delaware Co.; clinochlore from Chester Co.; and serpentine from Northampton Co.

CLARKE, JOHN MASON, 1857-1925, *see also* Hall, J., 20, 21, 22, 23.

1. George Huntington Williams, 1856-1894: Am. Geologist, v. 15, p. 69-81, port., 1895.
2. New *Agelacrinites:* N. Y. State Mus. Bull. 49, p. 182-198, illus., 1901. *Lepidodiscus alleganius* from Devonian rocks of Tioga Co. and *Agelacrinites beecheri* and *A. buttsi* from Mississippian rocks of Warren Co. are described and illustrated.
3. (and Swartz, C. K.). Systematic paleontology of the Upper Devonian deposits of Maryland: Md. Geol. Survey, Middle and Upper Devonian, p. 539-699, illus., 1913. Brachiopods from Bedford and Fulton Cos. and pelecypods from Bedford Co. are described and illustrated.
4. Memorial of William Bullock Clark [1860-1917]: Geol. Soc. America Bull., v. 29, p. 21-29, port., 1918.
5. Biographical memoir of William Bullock Clark, 1860-1917: Natl. Acad. Sci. Biog. Mem., v. 9, p. 3-18, port., 1919.
6. *Armstrongia,* a new genus of Devonian glass sponges [Erie Co.]: N. Y. State Mus. Bull. 219-220, p. 143-146, illus., 1920. *Ceratodictya onyx* is renamed *Armstrongia onyx.* It is described and illustrated.

CLAVAN, WALTER S., *see also* Norton, D. A., 2, 3.

1. (and McNabb, W. M., and Watson, E. H.). Some hypersthenes from [Delaware Co.] southeastern Pennsylvania and Delaware: Am. Mineralogist, v. 39, p. 566-580, illus., 1954. Examples from the Commonwealth are used in showing a new procedure for the chemical analysis of minerals high in iron, magnesium, and silica and which are low in calcium, aluminum, and the alkalies. Chemical, optical, x-ray, and spectrographic analyses are made.

CLEAVELAND, PARKER, 1780-1858.

1. An elementary treatise on mineralogy and geology . . . . 668 p., illus. incl. geol. map, Boston, Cummings and Hilliard, 1816; 2d ed., 2 vols., 818 p., 1822. A geological map which includes the Commonwealth is included.

CLEAVES, ARTHUR BAILEY, *see also* Scharon, H. L., 1, 2.

1. The geology of the New Bloomfield Quadrangle [Cumberland, Perry Cos.], Pennsylvania. Ph.D. thesis, Harvard Univ., 1933.
2. Geology in highway design and construction—the Pennsylvania Turnpike's western extension [abs.]: Geol. Soc. America Bull., v. 62, p. 1429, 1951.

CLOOS, ERNST

1. (and Hershey, H. G.). Structural age determination of Piedmont instrusives in Maryland: Natl. Acad. Sci. Proc., v. 22, p. 71-80, illus., 1936. Flow cleavage

and fracture cleavage studies are utilized to show that the Port Deposit Granodiorite and its associate the Baltimore Gabbro are probably late Paleozoic in age. Exposures along the Susquehanna River in York and Lancaster Cos. are described.

2. The application of recent structural methods in the interpretation of the crystalline rocks of Maryland [and southeastern Pa.]: Md. Geol. Survey, v. 13, p. 27-105, illus., 1937. Detailed descriptions of structural features in crystalline rocks include many from southeastern Pennsylvania.
3. Distortion of stratigraphic thickness due to folding: Natl. Acad. Sci. Proc., v. 28, p. 401-407, 1942. Examples are used from Franklin and Adams Cos. which show the increased thickness in beds resulting from flowage during folding.
4. (and Reed, J. C.). Memorial to Robert Ellsworth Fellows [1915-1949]: Geol. Soc. America Proc. 1949, p. 159-162, port., 1950.
5. Blue Ridge tectonics between Harrisburg [Dauphin Co.], Pennsylvania and Asheville, North Carolina: Natl. Acad. Sci. Proc., v. 43, p. 834-839, illus., 1957. The Blue Ridge Zone stands out as a major geologic boundary between rocks of different composition and ages; it is emphasized by a lineation and regional cleavage which can be recognized along its entire trend. The Blue Ridge is a normal anticlinorium in Pennsylvania.

CLOUD, PRESTON ERCELLE, JR.

1. Terebratuloid Brachiopoda of the Silurian and Devonian: Geol. Soc. America Spec. Paper 38, xi, 182 p., illus., 1942. *Nanothyris reesidei,* from the Keyser Formation in Northumberland Co.; *Rensselaerina leveneae,* from the Keyser Formation in Mifflin and Perry Cos.; and *Subrensselaeria claypolii,* from the Montebello Formation in Schuylkill Co., are described and illustrated.

CLOUD, WILLIAM K., *see* Murphy, L. M., 1, 2, 3.

COBB, ROBERT E.

1. Upper Devonian sediments of the "Gravel Canyon of Pennsylvania" [Tioga Co.]. M. S. thesis, Pa. State Coll., 1953.

COBBAN, WILLIAM AUBREY

1. John Bernard Reeside, Jr. (1889-1958): Am. Assoc. Petroleum Geologists Bull., v. 43, p. 2530-2533, port., 1959.

COCKERELL, THEODORE DRU ALISON, 1866-1948.

1. Samuel Hubbard Scudder [1837-1911]: Science, v. 34, p. 338-342, 1911.
2. Biographical memoir of Alpheus Spring Packard, 1839-1905: Natl. Acad. Sci. Biog. Mem., v. 9, p. 181-236, port., 1920.

COE, ANN CRANDALL

1. (and Conant, L. C., and Drakoulis, S.). [Map of] Oil and gas fields of the United States. Scale 1:2,500,000 (about 1 inch to 40 miles), 2 sheets, revised, U. S. Geol. Survey, 1955; originally published 1932.

COHEE, GEORGE VINCENT

1. (and Welch, S. W., and Drakoulis, S.). [Map of] Oil and gas fields of the United States. Scale 1:2,500,000 (about 1 inch to 40 miles), 2 sheets. U. S. Geol. Survey, 1951.

COHEN, E.

1. Das Meteoreisen von Millers Run bei Pittsburgh [Allegheny Co.] . . . : Naturwiss. Verein Neuvorpommern u. Ruegen Mitth., v. 35, p. 39-42, Griefswald, 1903. Various published analyses of this famous meteorite are compared. All indicate well over 90% for the iron content and over 5% for the nickel content. Traces of a few other metals are recorded also.

COLBERT, EDWIN HARRIS

1. (and Imbrie, J.). Triassic metoposaurid amphibians: Am. Mus. Nat. Hist. Bull., v. 110, p. 399-452, illus., 1956. *Eupelor durus* from the Brunswick Formation in Chester Co. is redescribed. *Calamops paludus* from Bucks Co. is considered to be an *E. durus.*

COLTON, I. C.

1. Report and statement of the mineral lands and property of the McKean [Co.] Railroad and Navigation Company . . . . 37 p., illus., New York, Wyknoop, Hallenbeck, and Thomas, 1858. This is a report accompanying a prospectus. Cannel coal and bituminous shale for gas manufacture, iron

ore, limestone, clay, and bituminous coal are present. Analyses of coal are included, as are columnar sections.

CONANT, LOUIS COWLES, *see* Coe, A. C., 1.

CONLIN, RICHARD RENAULT, *see also* Arndt, H. H., 1; Hoskins, D. M., 1; Miller, J. T., 3; Willard, B., 17.

1. (and others). The folded Appalachians from Harrisburg [Dauphin Co.] to Tyrone [Blair Co.]: [Part 2] *of* General geology of the folded Appalachian mountains of Pennsylvania, *in* Geol. Soc. America Guidebook for Field trips . . . , Field trip no. 7, p. 255-259, illus. incl. geol. sketch map, 1957. A brief description of Cambrian-Pennsylvanian, and Pleistocene deposits includes a road log.

CONRAD, TIMOTHY ABBOTT, 1803-1877.

1. Descriptions of new fossil mollusks, principally Cretaceous: Am. Jour. Conchology, v. 5, p. 96-103, illus., 1870. *Solemya triasina,* a pelecypod from the Triassic rocks in Montgomery Co., is described and illustrated.

COOK, GEORGE HAMMEL, 1818-1899.

1. Geological, including structural and lithological geology, Pt. 2 *of* N. J. State Geologist Ann. Rept. 1885, p. 36-96, 1885. Reference is made to the occurrence of *Schizoneura calamites planiscostata* from near Doylestown, Montgomery Co., in Triassic rocks.

COOPER, BRYON NELSON

1. Trilobites from the lower Champlainian formations of the Appalachian Valley: Geol. Soc. America Mem., v. 55, 69 p., illus., 1953. *Lonchodomas sublaevis,* in Ordovician rocks from Franklin Co., is described.
2. Marcellus Henry Stow, 1902-1957: Va. Jour. Sci., v. 9, p. [2]-4, port., 1958.

COOPER, GUSTAV ARTHUR, *see also* Ulrich, E. O., 4, 5.

1. (and Warthin, A. S., Jr.). New Devonian (Hamilton) correlations [Monroe Co.]: Geol. Soc. America Bull., v. 53, p. 873-888, illus., 1942. The easily-recognized Centerfield Formation fauna from Stroudsburg is used as a key for the correlation of other Devonian formations in the states around the Commonwealth. Fossils are listed.
2. Obituary [Charles Schuchert, 1858-1942]: Wash. Acad. Sci. Jour., v. 33, p. 352, 1943.
3. Unusual Devonian brachiopods: Jour. Paleontology, v. 28, p. 325-332., illus., 1954. The genus *Sphenospira* comes from the Conewango Stage in Ohio and northwestern Pennsylvania. It is illustrated and described.
4. Faunal suites of the Appalachian Middle Ordovician [southern Pa.] [abs.]: Geol. Soc. America Bull., v. 66, p. 1686-1687, 1955.
5. Chazyan and related brachiopods: Smithson. Misc. Coll., v. 127, pt. 1, text, p. xvi, 1-1024, illus.; pt. 2, plates, p. 1025-1245, illus., 1956. A cursory description of the formations in the Commonwealth is followed by a systematic paleontological review. Many genera and species from many places in the state are described and illustrated.

COOPER, H. M.

1. (and others). Analyses of Pennsylvania anthracite coals: U. S. Bur. Mines Tech. Paper 659, 271 p., illus., 1944.

COOPER, MARGARET

1. Bibliography and index of literature on uranium and thorium and radioactive occurrences in the United States, Part 5 . . . : Geol. Soc. America Spec. Paper 67, 472 p., 1958. References to geographic, stratigraphic, and mineralogic occurrences in the Commonwealth are listed. The bibliography is not annotated, but the index is, in part.

COPE, EDWARD DRINKER, 1840-1897.

1. Synopsis of the extinct Batrachia of North America: Acad. Nat. Sci. Philadelphia Proc. 1868, p. 208-221, 1868. *Sauropleura remex* is described from [Pennsylvanian] rocks of western Pennsylvania, and the genus *Eupelor* is erected from *Mastodontosaurus durus,* the name of an amphibian from Triassic rocks in Chester Co.
2. Synopsis of extinct Batrachia, Reptilia, and Aves of North America: Am. Phil. Soc. Trans. new ser., v. 14, p. 1-252, illus., 1871. A complete monograph includes illustrations and descriptions of amphibians from Triassic rocks in Chester Co. and reptiles from Triassic rocks in Chester and Montgomery Cos.

3. Triassic saurians from [Chester Co.] Pennsylvania [abs.]: Am. Naturalist, v. 12, p. 58, 1878.
4. An interesting connecting genus of Chordata [Beaver Co.]: Am. Naturalist, v. 20, p. 1027-1031, illus., 1886. *Mycterops ordinatus* from the Pennsylvanian Darlington Shale in Beaver Co. is described and illustrated. It is called a fish but is more likely a part of a eurypterid. [see Kjelleswig Waering, 1959].
5. A contribution to the history of the Vetebrata of the Trias of North America: Am. Phil. Soc. Proc., v. 24, p. 209-228, illus., 1888. Parts of the amphibian *Eupelor durus* from York Co. are described.
6. The pineal eye in extinct vertebrates: Am. Naturalist, v. 22, p. 914-917, 1888. An illustration of *Mycterops ordinatus,* a fish, is included in a general discussion. This specimen, from the Darlington Shale in Beaver Co., is probably a eurypterid.
7. On the characters of some Paleozoic fishes [Tioga Co.]: U. S. Natl. Mus. Proc., v. 14, p. 447-463, illus., 1891. A spine of *Holonema* sp. from [Devonian] rocks at Mansfield, Tioga Co., is described and illustrated.

CORSS, FREDERIC

1. Drift mounds of the Susquehanna Valley [Central Pa.]: Wyoming Hist. and Geol. Soc. Proc. and Coll., v. 5, p. 153-167, 1900. Mounds of glaciofluvial material in the Susquehanna River valley are attributed to being residues of glacial-lake sediments, most of which were scoured away by the strong currents which developed when ice dams in the river downstream broke.

CRAIG, LAWRENCE CAREY

1. Lower Middle Ordovician of south central Pennsylvania. Ph.D. thesis, Columbia Univ., 1949.

CRAMER, HOWARD ROSS

1. A detailed Conestoga Limestone section in Lancaster County: Pa. Acad. Sci. Proc., v. 31, p. 106-113, illus., 1957. A section of uncertain thickness is described in detail. Cyclical sedimentation is suggested. Data are presented in a table.
2. Ordovician starfish from the Martinsburg Shale, Swatara Gap, [Lebanon Co.], Pennsylvania: Jour. Paleontology, v. 31, p. 903-907, illus., 1957. *Taeniaster spinosus and Promopalaeaster pricei* are described and illustrated.
3. Additions to the Hamilton biota at Rockville, Dauphin County, Pennsylvania: Pa. Acad. Sci. Proc., v. 32, p. 184-187, illus., 1958. A blastoid, a nautiloid, and spores (?) from the Devonian Montebello Sandstone are described and illustrated.
4. Devonian starfish from Pike County, Pennsylvania: Jour. Paleontology, v. 33, p. 471-473, illus., 1959. *Hudsonaster wardi* from the Mahantango Formation is described and illustrated.
5. The geologic literature of Pennsylvania: Pa. Acad. Sci. Proc., v. 33, p. 209-213, 1959. A brilliant review of the historical development of the literature dealing with the geology of the Commonwealth.

CRESSEY, GEORGE BABCOCK

1. Wallace W[alter] Atwood, 1872-1949: Assoc. Am. Geographers Annals, v. 39, p. 296-306, port., 1949.

CRICHTEN, ANDREW B.

1. How much coal do we really have? The need for an up-to-date survey: Am. Inst. Min. and Metall. Engineers Tech. Pub. 2428, 12 p., 1948; Trans., v. 177, p. 26-38, 1948; Coal Technology, v. 3 no. 3, 12 p. incl. discussion, 1948. This is an exhortation for the review of coal-reserve figures. He claims that all figures, including those for the Commonwealth, are too high.

CRONEIS, CAREY GARDINER

1. Early history of petroleum in North America: Sci. Monthly, p. 124-133, illus., 1933. A survey of the early history of the industry includes stories and data from the Commonwealth.

CROOK, J. K.

1. Mineral waters of the United States and their therapeutic uses. viii, 587 p., New York, Lea Bros. and Co., 1899. Twenty-one different mineral springs in Pennsylvania are described; the water is analyzed.

CROSBY, IRVING BALLARD

1. Glacial erosion and the buried Wyoming Valley [Wyoming Co.] of Pennsylvania: Geol. Soc. America Bull., v. 56, p. 389-400, illus., 1945. The valley

strikes parallel to the direction of ice movement and contains overdeepened rock basins separated by rock ridges. The maximum overdeepening is about 150 feet. The influence of geologic structure and of preglacial topography upon glacial erosion is discussed.

CROSS, AUREAL THEOPHILUS, *see also* Shapiro, N., 1.

1. (and Smith, W. H., and Arkle, T., Jr.). Field guide for the special field conference on the stratigraphy, sedimentation, and nomenclature of the Upper Pennsylvanian and Lower Permian strata (Monongahela, Washington and Greene Series) in the northern portion of the Dunkard Basin of . . . [Washington, Greene Cos.] Pennsylvania. 104 p. (‡), illus. incl. geol. map, privately printed, [Morgantown, W. Va. ?] 1950. Detailed road logs for a field trip include sketches of road cuts and cross sections, profiles of exposures, and detailed descriptions of the Upper Pennsylvanian and Permian formations in Greene and Washington Cos. Correlations with Ohio and West Virginia are included.
2. (and Schemel, M. P.). Representative microfossil floras of some Appalachian coals: Congrès pour l'avancement des études de stratigraphie et de géologie carbonifière 3d, Heerlen 1951, C. R., v. 1, p. 123-130, illus., Maastricht, 1952. Illustrations of spore suites from several places in the western counties are given.
3. Summary of two conferences on problems of Dunkard stratigraphy and resulting interpretation [southwestern Pa.] [abs.]: Econ. Geology, v. 47, p. 769, 1952; Geol. Soc. America Bull., v. 63, p. 1241, 1952.
4. The geology of the Pittsburgh coal [Applachian Basin], *in* Conf. on origin and constitution of coal 2d, Nova Scotia 1952, [Proc.], p. 32-111, illus., with discussion, N. S. Dept. Mines, [1952]; reprinted *as* W. Va. Geol. Survey Rept. Inv. 10, p. 32-99, illus., 1954. A very detailed discussion of the stratigraphy, petrology, origin and composition, and geologic interpretation of the entire coal unit is given. Southwestern Pennsylvania is included. The coal occurs in the Monongahela Formation.
5. (and Arkle, T., Jr.). The stratigraphy, sedimentation and nomenclature of the Upper Pennsylvanian—Lower Permian (Dunkard) strata of the Appalachian area: Congrès pour l'avancement des études de stratigraphie et de géologie carbonifière 3d, Heerlen 1951, C. R., v. 1, p. 101-110, illus., Maastricht, 1952; discussion, p. 110-111. Southwestern Pennsylvania is included. Very detailed measured sections permit the recognition of cyclothems as units which resemble one another more vertically than laterally because of facies changes. Several cyclothems can be grouped into a formation. There is no major lithologic change in the entire section, and some beds in cyclothems have been traced over fifty miles. The coal and its "seat rock" are the most persistent members of the cyclothem.
6. Fossil flora of the Dunkard strata of the eastern United States [Washington, Greene Cos.], *in* Sturgeon, M. T., The geology and mineral resources of Athens County, Ohio: Ohio Div. Geol. Survey Bull. 57, p. 191-197, illus., 1958; summary, Internatl. Bot. Cong. 8th, Paris 1954, C. R. sec. 5, p. 139-140 [1954]. The plants of the Dunkard strata are discussed; many are illustrated. The age of the strata is discussed, and no positive conclusion is as yet possible.

CUMINGS, EDGAR ROSCOE

1. August Frederick Foerste [1862-1936]: Ind. Acad. Sci. Proc., v. 46, p. 20-21, 1937.

DAKE, CHARLES LAURENCE, 1883-1934, *see* Fenneman, N. M., 3.

DAKE, HENRY CARL

1. The saga of Doctor [Albert E.] Foote [1846-1895]: Mineralogist, v. 27, p. 195-200, port., 1959.

DALHAUSEN, JAMES K., *see* Gault, H. R., 4.

DALSON, AUGUST F.

1. Engineer's report [includes general description of the map] *in* First annual report of the board of directors of the McKean and Elk [Cos.] Land and Improvement Co. . . . , p. 8-26, illus., Philadelphia, E. C. and J. Biddle, 1857. This is a geological report accompanying a report to stockholders. Bituminous coal and iron ore are present.

2. Report [of geological work] *in* Second annual report of the board of directors of the McKean and Elk [Cos.] Land and Improvement Company . . . , p. 5-20, illus., Philadelphia, E. C. and J. Biddle, 1858. The nature of the occurrence of the coal is discussed. A stratigraphic section is included.

DALY, REGINALD ALDWORTH, 1871-1957.

1. Biographical memoir of William Morris Davis, 1850-1934: Natl. Acad. Sci. Biog. Mem., v. 23, p. 263-303, port., 1945.

DANA, EDWARD SALISBURY, 1849-1935

1. Biographical memoir of George Jarvis Brush, 1831-1912: Natl. Acad. Sci. Mem., v. 17, p. 105-112, port., 1924.

DANA, FREDERICK F.

1. Oil pay shapes in the Hundred-foot Sand [western Pa.]. M. S. thesis, Univ. Pittsburgh, 1931.

DANA, JAMES DWIGHT, 1813-1895.

1. Crystallization of brucite [Lancaster Co.], [Part] 5 *of* Mineralogical contributions: Am. Jour. Sci. 2d ser., v. 17, p. 83-84, illus., 1854. Minute rhombohedral crystals of a druse of brucite are described.
2. Crystallization of hydromagnesite [Lancaster Co.] and its homeomorphism with wollastonite, [Part] 6 *of* Mineralogical contributions: Am. Jour. Sci. 2d ser., v. 17, p. 84-85, illus., 1854. Hydromagnesite (lancasterite) is optically examined in detail and shown to be homeomorphous with wollastonite.
3. The origin of the Jura-Trias of eastern North America: Am. Jour. Sci. 3d ser., v. 25, p. 383-386, 1883. The Triassic rocks in the eastern United States, including those in the Commonwealth, were deposited during a period of great precipitation with one or more long intervals of excessive cold.

DANILCHIK, WALTER

1. (and Rothrock, H. E., and Wagner, H. C.). Geology of anthracite in the western part of the Shenandoah Quadrangle [Schuylkill Co.], Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 21 (2 sheets). Scale 1:12,000 (1 inch to 1000 feet), with sections and text, 1955. A coal outcrop map and a structure contour map of the Buck Mountain coal bed precede a description and cross section of the area. Complex, faceted synclines characterize the structure.

DANNENBERG, A.

1. Die Steinkohlenlager Nordamerikas: Internatl. Bergwirtschaft u. Bergtechnik, Jahrg. 24, p. 51-57, 65-73, illus., Halle, 1931. A general survey of Pennsylvanian stratigraphy in the Appalachian Mountains includes that of the Commonwealth. No new information is included, however.

DARBY, WILLIAM

1. Geographical view of Pennsylvania: Geog., Hist., and Stat. Repository, v. 1, p. 9-35, illus., 1824. A general account of the Commonwealth includes descriptions of the topography, rivers, and mineral resources.

DARLINGTON, WILLIAM, *see* Rogers, H. D., 3.

DARRAH, WILLIAM CULP

1. Stephanian in America [abs.]: Geol. Soc. America Proc. 1933, p. 451, 1934.
2. Sur la presence d'equivalents de terrains Stephaniens dans l'Amerique du Nord: Soc. gèol. Nord Annales, v. 61, p. 187-197, Lille, 1936. A comparison of European and American (including Pennsylvania) floral zones emphasizes the paleobotanical similarities. The typical Stephanian flora of Europe is found in the Conemaugh Formation.
3. American Carboniferous floras: Congrès pour l'avancement des études de stratigraphie et de géologie carbonifière 2d, Heerlen 1935, C. R., v. 1, p. 109-129, illus., Maastricht, 1937. The floral distinctions between the series of the Pennsylvanian System in the Commonwealth are reviewed and compared with those of Europe. Fossils are listed. This is an argument, in part, for retaining the type section of the Pennsylvanian System in the Commonwealth.
4. Notes on *Lepidodendropsis:* Paleobot. Notices 1, 16 p. (‡), illus., privately published, 122 Lincoln Road, Medford 55, Mass., 1949. A discussion of the group includes illustrations and descriptions of *Stigmaria minuta* from Pottsville Gap, Carbon Co., and suggests that it be combined with others in *Lepidodendropsis corrugatum.* The work of Jongmans, Gothan, and Darrah is alluded to extensively.

DARTON, NELSON HORATIO, 1865-1948.

1. The relations of the traps of the Newark System in the New Jersey region: U. S. Geol. Survey Bull. 67, 82 p., illus., 1890. A detailed stratigraphic and structural description of the Triassic diabase dikes and sills includes a bit of information about those in southeastern Pennsylvania.
2. On certain features in the distribution of the Columbia Formation on the Middle Atlantic Slope [abs.]: Am. Geologist, v. 11, p. 244, 1893; discussion by W. Upham, p. 244.
3. Preliminary list of deep borings in the United States, Part 2 . . . : U. S. Geol. Survey Water Supply Paper 61, 67 p., 1902. Several hundred wells are tabulated by county, location, depth, diameter, water yield, height of water, and remarks.
4. Memoir of WJ McGee [1853-1912]: Assoc. Am. Geographers Annals, v. 3, p. 103-110, [1915].
5. Memorial of David Talbot Day [1895-1925]: Geol. Soc. America Proc. 1933, p. 185-192, port., 1934.

DAUBENY, CHARLES

1. Sketch of the geology of North America . . . . xviii, 73 p., illus., Oxford, Ashmolean Soc., 1839. A review of the geology of the United States east of the Mississippi River includes notes about that of the Commonwealth. The Paleozoic rocks of Pennsylvania are outlined; the coal-bearing formations being given special consideration. Salt springs in Allegheny Co. are mentioned.

DAVEY, WHEELER P., *see* Navais, L., 1.

DAVIDSON, CHARLES F.

1. [Charles Kenneth Leith, 1875-1956]: Geol. Soc. London Proc., no. 1554, p. 133-134, 1957.

DAVIES, ARTHUR MORLEY

1. [William Morris Davis, 1850-1934]: Geologists Assoc. London Proc., v. 47, p. 95-96, 1936.

DAVIES, JOHN H.

1. Nonmarine shells of upper Carboniferous rocks of North America: Wyoming Hist. and Geol. Soc. Proc. and Coll. 1927-29, v. 21, p. 98-106, illus., 1930. A list of the fresh-water clams in the U. S. National Museum collection includes *Carbonicula* cf. *aquilina* from Pennsylvanian rocks in Carbon Co., and *C.* cf. *nitida* from somewhere in Pennsylvania. *C. ovalis,* C. sp., and *Anthraconomya* sp., are from Pennsylvanian rocks in Carbon Co., and are in the collection of the Wyoming Hist. and Geol. Soc. museum. Some are illustrated; brief remarks are included.

DAVIES, WILLIAM EDWARD

1. Geology of Pennsylvania caves: Natl. Speleol. Soc. Bull. 15, p. 3-9, illus., 1953. A brief review of the widespread limestone formations which contain caves is given. It includes a discussion of the general patterns of caves as related to rock structure. Caves are widespread in the Commonwealth.

DAVIS, CHARLES ALBERT, 1861-1916.

1. Israel Cook Russell [1852-1906]: Mich. Acad. Sci. Rept., v. 9, p. 28-31, 1907.

DAVIS, GORDON LESLIE, *see also* Tilton, G. R., 1.

1. (and others). Age of the Baltimore Gneiss [southeastern Pa.] [abs.]: Geol. Soc. America Bull., v. 69, p. 1550-1551, 1958.

DAVIS, JOSEPH DANA

1. (and others). Carbonizing properties and petrographic composition of thick Freeport-bed coal from Harmar Mine, Harmarville, Allegheny County, Pa. . . . : U. S. Bur. Mines Tech. Paper 655, 46 p., illus., 1943. Photomicrograph illustrations of composition and analyses are included in an otherwise purely technical report.
2. (and others). Carbonizing properties . . . Upper and Lower Kittanning and Upper and Lower Freeport coals from Pennsylvania: U. S. Bur. Mines Bull. 496, 42 p., illus., 1950. Proximate and ultimate analyses of many samples are included.

DAVIS, WILLIAM MORRIS, 1850-1934.

1. Rivers and valleys of Pennsylvania, *in* Geographical essays, p. 413-485, illus., Boston and N. Y., Ginn and Co., 1909; republished 1954. A general review of the geology and physiography of the Commonwealth is followed by a

discussion of drainage patterns. The streams were consequent upon the Appalachian folded mountains in Carboniferous time and adjusted themselves to the present topography as erosion lowered the land. Later emphasis is on the major drainage's being antecedent.

2. Grove Karl Gilbert [1843-1918]: Am. Jour. Sci. 4th ser., v. 46, p. 669-681, 1918.
3. Biographical memoir of Grove Karl Gilbert, 1843-1918: Natl. Acad. Sci. Mem., v. 21, 5th mem., 303 p., illus. incl. port., 1926.
4. Origin of limestone caverns: Geol. Soc. America Bull., v. 41, p. 475-628, illus., 1930. A monograph on the origin of different types of caves includes, as examples, some from the Commonwealth.
5. Physiographic contrasts, east and west: Sci. Monthly, v. 30, p. 395-415, 501-519, illus., 1930. A cursory, popular, illustrated review of physiographic features comparing the eastern and western United States includes some examples from the Commonwealth.

DAY, DAVID TALBOT, 1859-1925, *see* Clapp, F. G., 1.

DEASY, GEORGE F.

1. (and Griess, P. R.). Some new maps of the underground bituminous coal mining industry of Pennsylvania: Assoc. Am. Geographers Annals, v. 47, p. 336-349, illus. incl. geol. sketch maps, 1957. Maps show distribution, county production, utilized seams, types of entry, depth of shafts, seam thickness, underground production, Pittsburgh seam distribution, and reserves. Each is analyzed economically.
2. (and Griess, P. R.). Bituminous coal fields and selected seams of Pennsylvania, *in* Bituminous coal, Part 1 *of* Atlas of Pennsylvania coal and coal mining: Pa. State Univ. Mineral Industries Exper. Sta. Bull. 73, p. 5-14, illus., [1959]. Maps show the distribution of selected coal beds in western Pennsylvania. Little detail is given.
3. (and Griess, P. R.). Maps of currently producing bituminous coal seams in Pennsylvania: Mineral Industries, v. 28, no. 6, p. 4-6, illus., 1959. A series of small-scale county outline maps of the Commonwealth indicate, by black circles, the number of tons taken from each coal bed per county. Underground mining and stripping are considered separately.

DECKER, ROBERT W.

1. Structural transition across the Appalachian fold front in north central Pennsylvania. M. S. thesis, Mass. Inst. Tech., 1951.

DEDMAN, KATHRYN K., *see* Armstrong, J. C., 1.

DEELEY, R. M.

1. North American and European drift deposits: Geol. Mag. 5th dec., v. 10, p. 14-17, illus., London, 1913. This is a review of the work of others, showing the similarities in correlations. The term Allegheny Drift is used for lower Pleistocene drift material of uncertain provenance.

DEEVEY, EDWARD SMITH, JR.

1. (and Gralenski, L. J., and Hoffren, V.). Yale natural radiocarbon measurements, [Pt.] 4: Am. Jour. Sci. Radiocarbon Supp., v. 1, p. 144-172, 1959. Samples from "The Marsh" in Chester Co. are 12,690±220 years old. The sediments are probably Wisconsin in age.

DEGENS, EGON T.

1. (and Williams, E. G., and Keith, M. L.). Geochemical criteria for differentiating marine from fresh-water shales, Part 1 *of* Enviromental studies of Carboniferous sediments [western Pa.]: Am. Assoc. Petroleum Geologists Bull., v. 41, p. 2427-2455, illus., 1957. Examples are taken from the Commonwealth. Trace-element assemblages and certain clay-mineral ratios are, in some respects, characteristic of the environment of deposition of shales. Ni and Va are concentrated in organic residues of marine shale, and Pb, Zn, Cu, and Sn are in fresh-water-shale organic residues. Spectrographic analyses show that boron, gallium, and rubidium can be used as discriminants also.
2. (and Williams, E. G., and Keith, M. L.). Application of geochemical criteria [western Pa.], Part 2 *of* Environmental studies of Carboniferous sediments: Am. Assoc. Petroleum Geologists Bull., v. 42, p. 981-997, illus., 1958. Samples from the Commonwealth are used in an investigation which shows that the

fresh-water or marine character of sedimentary rocks can be determined by geochemical criteria. Trace elements, boron, gallium, and rubidium are used.

DEIKE, GEORGE, 3d

1. [Tylistoco Cave, Blair Co.]: Nittany Grotto Newsletter, v. 5, no. 7, p. 9 (‡), illus., 1957. A sketch map and brief description are given.

DELEVAUX, M. H., *see* Stern, T. W., 1.

DELLWIG, L. F.

1. Stockton gravels of Pennsylvania. Unpublished manuscript, Lehigh Univ., 1948. [not seen]

DELO, DAVID MARION

1. Phacopid trilobites of North America: Geol. Soc. America Spec. Paper 29, vii, 135 p., illus., 1940. *Greenops boothi colletiles,* from Devonian rocks of Huntingdon Co., is described and illustrated. Many others from the Devonian of New York "and vicinity" or "neighboring areas" are included also.

DEMAREST, DAVID FRANKLIN, *see* Pepper, J. F., 1.

DEMSHAR, LUDWIG S.

1. A study of the heavy minerals in the Connellsville Sandstone in the Pittsburgh [Allegheny Co.] area. M. S. thesis, Univ. Pittsburgh, 1953.

DENNIS, L. M.

1. Biographical memoir of Frank Wigglesworth Clarke, 1847-1931: Natl. Acad. Sci. Biog. Mem., v. 15, p. 139-165, port., 1934.

DENNY, CHARLES STORROW

1. Pleistocene frost action near the border of the Wisconsin drift in [Potter Co.] Pennsylvania, *in* Braun, E. L., chm., Symposium, the glacial border—climatic, soil, and biotic features: Ohio Jour. Sci., v. 51, p. 116-125, illus., 1951; reprinted *in* Ecol. Soc. America 35th Ann. Mtg., Sept. 12, 1950 [Columbus, 1951]. Blockfields, boulder rings, and boulder stripes are explained as periglacial, frost action features.
2. Friends of Pleistocene Geology—17th reunion [Pa.] [abs.]: Science, v. 120, p. 554, 1954.
3. Surficial geology and geomorphology of Potter County, Pennsylvania: U. S. Geol. Survey Prof. Paper 288, v, 72 p., illus. incl. geol. map, 1956. A detailed study of the glacial deposits of the Genessee Quadrangle is included in a generalized study of the rest of the county. Sections are measused; analyses are made. The origins of the upland surfaces, soils, and drainage patterns are discussed.

DENTON, GEORGE H.

1. Plant microfossil assemblages in lower Allegheny coal beds of northeastern Ohio, western Pennsylvania, and northern West Virginia [abs.]: Geol. Soc. America Bull., v. 68, p. 1715-1716, 1957.

DEVITT, WILLIAM, 3d

1. Kooken—Pennsylvania's toughest cave [Huntingdon Co.]: Natl. Speleol. Soc. Bull. 15, p. 31-33, illus., 1953. This is a detailed description of a cave with difficult-to-traverse passages in steeply dipping limestone. An historical account in included.
2. (and Hussey, A. M.). Surface exploration in central Pennsylvania: Mid-Appalachian [Region] Bull. 1, p. 7-15 (‡), 1954. An outline for a procedure to systematically examine the surface for the entrances to caves is given. Geological maps are consulted for limestone terrane. The Black River, Trenton, and Helderberg Groups are the most productive, cave-wise. The areas are systematically scoured from the surface. Data are recorded.

DE WITT, WALLACE, JR., *see also* Pepper, J. F., 1.

1. Stratigraphy of the Berea Sandstone and associated rocks in northeastern Ohio and [Crawford, Erie, Venango Cos.] northwestern Pennsylvania: Geol. Soc. America Bull., v. 62, p. 1347-1369, illus., 1951. Correlations of the Upper Devonian and Lower Mississippian rocks between Ohio and the Commonwealth are made. Facies maps are included. The Bedford and Berea Formations merge with the Shellhammer Hollow Formation; the Cussewago Sandstone is not a member of the Berea Formation; the Corry Sandstone merges with the Shellhammer Hollow Formation, and the Bartholomew Siltstone is a member of the Orangeville Shale.

DICKESON, MONTROVILLE WILSON

1. Report of the geological survey and condition of the Gap Mining Company's property, Lancaster County, Pennsylvania. 26 p., illus., Philadelphia, J. B. Chandler, 1860. A description of the mining property includes a discussion of the ore body as it appears in the subsurface. A tendency for increased production should accompany depth. Chalcopyrite and pyrite contain nickel, and are enclosed in quartz veins which have intruded the igneous rocks of the area. Five shafts are used on two veins.
2. Report of the geological survey of the Dickeson Lead Mine, Bucks County, Pennsylvania. 10 p., Philadelphia, J. B. Chandler, 1860. Galena occurs in quartz veins. To read this report, this mine should have flooded the market with lead. This is a prospectus; he wants to sell his own company stock.
3. Report of the geological survey of ten thousand acres of land in Lycoming County, Penna. 10 p., illus., Philadelphia, E. C. Markley and Son, 1865. This is a report designed to accompany a prospectus. Bituminous coal and iron are present.
4. Report of the geological survey of two thousand acres of land, Cameron County, Penna. 8 p., Philadelphia, Alexander, 1865. A report designed for a prospectus describes the occurrences of coal, sandstone, petroleum, and iron ore.

DICKEY, PARKE ATHERTON, *see also* Fettke, C. R., 3.

1. Memorial to Richard E[llis] Sherrill (1899-1952): Geol. Soc. America Proc. 1953, p. 149-151, port., 1954.
2. Oil is found with ideas: Tulsa Geol. Soc. Digest, v. 26, p. 84-101, illus., 1958; condensed, Oil and Gas Jour., v. 56, no. 37, p. 284-291 incl. ads., illus., 1958; excerpt, Pa. Dept. Internal Affairs Monthly Bull., v. 27, no. 2, p. 16-23, illus., 1959. This is a discussion of the philosophy of petroleum exploration, with examples taken from the Commonwealth.
3. 100 years of oil geology—Part 1: GeoTimes, v. 3, no. 6, p. 6-9, 24-25, illus., 1959; Part 2, no. 7, p. 6-7, 24-25, 1959. An historical review of the industry includes much data from the Commonwealth.

DIEFFENBACH, OTTO

1. Das Vorkommen von Chrom-Erzen und ihre Verarbeitung in den Vereinigten Staaten von Nord-Amerika: Neues Jahrb. 1855, p. 533-539, Stuttgart, 1855. A brief description of the Wood Mine in Lancaster Co. is given; an analysis of the ore is also made.
2. Bemerkungen ueber den Mineralreichtum der Vereinigten Staaten von Nord-Amerika: Neues Jahrb. 1855, p. 527-532, 1855; . . . 1856, p. 385-394, Stuttgart, 1856. A general review of the mineral industry of the United States includes that of the Commonwealth. No new data are included.

DIETRICH, RICHARD VINCENT

1. Is anthraxolite related genetically to coal or to oil?: Econ. Geology, v. 51, p. 649-664, illus., 1956. Anthracite and crude oil from the Commonwealth are used along with other materials from other places in studies to determine the origin of the bitumen anthraxolite. X-ray analyses and other standard tests are made. There is no anthraxolite reported from the Commonwealth.

DIKE, PAUL A.

1. Megascopic structures and metamorphism of the Wissahickon Formation of central Delaware County, Pennsylvania. M. A. thesis, Bryn Mawr Coll., 1950.
2. Kyanite pseudomorphs after andalusite from Delaware County, Pennsylvania: Am. Jour. Sci., v. 249, p. 457-458, 1951. Andalusite is shown to be altered by metamorphism to kyanite.

DILLON, LAWRENCE S.

1. Wisconsin climate and life zones in North America: Science, v. 123, p. 167-176, illus., 1956. A North American climatic and biogeographic appreach to Pleistocene ice-sheet studies includes the Commonwealth. Pleistocene climates are postulated.

D'INVILLIERS, EDWARD VINCENT, 1857-1928.

1. Geological report on the Somerset lands of Messrs. W. P. Humes, Executor, and J. J. Dull, Somerset County, Pennsylvania. 21 p., illus., [? Philadelphia] [priv. pub.?] 1898; reprinted 1916. Most of the property is in Elk Lick

Township. A simple syncline is present, exposing the [Pennsylvanian] section, which is described. Eighteen coal seams, including the Pittsburgh Coal, are present; seven are important.

DOBBINS, DAVID A.

1. (and Swain, F. M., Jr.). Stratigraphy and organic substances of Middle and Upper Devonian, Orbisonia Quadrangle, [Huntingdon, Fulton Cos.] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1590, 1959.

DODGE, RICHARD ELWOOD

1. William Morris Davis [1850-1934]—an appreciation: Geog. Jour., v. 33, p. 148-50, London, 1934.

DODSON, CHESTER L.

1. The Pocono of southwestern Pennsylvania and northern West Virginia [abs.]: W. Va. Acad. Sci. Proc., v. 24, p. 135, 1953.

DOEHLER, ROBERT WILLIAM, *see* Droste, J. B., 5.

DONALDSON, ALAN CHASE, *see also* Swartz, F. M., 6.

1. Stratigraphy and fabrics of Lower Ordovician Stonehenge Limestone in Nittany Valley, [central] Pennsylvania. M. S. thesis, Pa. State Univ., 1959.

DONEY, HUGH H.

1. Pelecypods of the Conemaugh Series from Pittsburgh, Pennsylvania, and neighboring areas [Allegheny Co.]. M. S. thesis, Univ. Pittsburgh, 1954.

DONN, WILLIAM L., *see* Becker, H. F., 1.

D'OOGE, M. L., *see* Lombard, W. R., 1.

DORF, ERLING, *see* Geol. Soc. America, 1.

DORT, WAKEFIELD, JR.

1. Elementary geology in a large state university—Penn. State: Jour. Geol. Education, v. 3, p. 63-64, 1955. Some of the problems connected with teaching large classes in a large state university are described.
2. Anomalous bedding attitudes, Appalachian Front, central Pennsylvania [abs.]: Geol. Soc. America Bull., v. 68, p. 1717-1718, 1957.
3. Occurrences of ground water—principles and applications to Pennsylvania: Mineral Industries, v. 26, no. 5, p. 1-3, 8, illus. incl. port., 1957. A general review of ground water includes a few examples of occurrences from the Commonwealth. No new data are included.
4. Faulting along Appalachian Front, central Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1591, 1959.
5. Preliminary geologic map of part of Allensville Quadrangle [Huntingdon Co.], Pennsylvania: Compass, v. 36, p. 336-338, illus., 1959. Silurian-Devonian rocks are mapped. The major structure is a broad, gently-southwest-plunging, asymmetrical syncline with the southeastern limb the steeper. Subordinate folds are present. A small-scale sketch map is included.

DOTT, ROBERT HENRY

1. Morris Morgan Leighton, honorary member: Am. Assoc. Petroleum Geologists Bull., v. 34, p. 975-977, port., 1950.

DOWD, JAMES JOSEPH

1. (and others). Estimate of known recoverable reserves of coking coal in Cambria County, Pa.: U. S. Bur. Mines Rept. Inv. 4734, 25 p., (‡), illus., 1950. Over 2,400 million short tons remain. The Upper Freeport, Lower Freeport, Upper Kittanning, and Lower Kittanning coal beds are the most important. Analyses are included.
2. (and others). Estimate of known recoverable reserves of coking coal in Indiana County, Pa.: U. S. Bur. Mines Rept. Inv. 4757, 22 p. (‡), illus., 1950. Over 1,980 million short tons remain. The Upper Freeport, Lower Freeport, and Lower Kittanning coal beds are the most important. Analyses are included.
3. (and others). Estimate of known recoverable reserves of coking coal in Armstrong County, Pa.: U. S. Bur. Mines Rept. Inv. 4801, 16 p., illus., 1951. Over 1,550 million short tons remain. There are 7 beds of importance, the Upper Freeport and Lower Kittanning being the most so. Analysis are included.
4. (and others). Estimate of known recoverable reserves of coking coal in Fayette County, Pa.: U. S. Bur. Mines Rept. Inv. 4807, 19 p., illus., 1951. Over 940 million short tons remain. Seven coal beds are present, of which

the Pittsburgh and Sewickley are the most important. Analyses are given.

5. (and others). Estimate of known recoverable reserves of coking coal in Westmoreland County, Pa.: U. S. Bur. Mines Rept. Inv. 4803, 16 p., illus., 1951. Over 920 million short tons remain. Six coal beds are present, of which the Pittsburgh and Upper Freeport are the most important. Analyses are included.
6. (and others). Estimate of known recoverable reserves of coking coal in Jefferson County, Pa.: U. S. Bur. Mines Rept. Inv. 4840, 18 p., illus., 1952. Over 700 million short tons remain in reserve. There are 8 minable coal beds, the Lower Freeport being the most important. Some analyses are included.

DRAKOULIS, SOPHIE, *see* Coe, A. C., 1; Cohee, G. V., 1.

DROSTE, JOHN BROWN, *see also* Shepps, V. C., 3; White, G. W., 2.

1. Alteration of clay minerals by weathering in Wisconsin tills [northwestern Pa.]: Geol. Soc. America Bull., v. 67, p. 911-918, illus., 1956. X-ray studies of clay from vertical profiles, from fresh till to the A soil zone, are given. Each zone is characterized by a clay-mineral assemblage.
2. Clay minerals in calcareous till in northeastern Ohio [and Lawrence and Mercer Cos.]: Jour. Geology, v. 64, p. 187-190, illus., 1956. The clay-mineral content was determined by x-ray techniques. The difference in clay-mineral content of till horizon V (unoxidized) and horizon IV (oxidized) is pointed out, and it is suggested that the clay minerals present in tills of different ages may be used as an aid in correlation.
3. (and White, G. W., and Vatter, A. E.). Electron micrography of tills [northwestern Pa.] [abs.]: Geol. Soc. America Bull., v. 68, p. 1719, 1957.
4. (and Tharin, J. C.). Alteration of clay minerals in Illinoisian till by weathering [Venango Co.]: Geol. Soc. America Bull., v. 69, p. 61-67, illus., 1958. X-ray analyses of closely spaced samples throughout the weathering profile from fresh till to the A soil zone show that each zone is characterized by a specific clay-mineral assemblage.
5. (and Doehler, R. W.). Clay mineral composition of calcareous till in northwestern Pennsylvania: Ill. State Acad. Sci. Trans. 1957, v. 50, p. 194-198, illus., 1958. Over 200 samples of till were investigated. Details of the type and distribution of clay minerals are given in summary; no tables are included. The unleached Illinoisian, Cary, and Tazewell tills contain chlorite and illite. The clays of the oxidized, calcareous tills are variable and their types depend on the original till composition and age.
6. (and Rubin, M., and White, G. W.). Age of marginal Wisconsin drift at Corry [Erie Co.], northwestern Pennsylvania: Science, v. 130, p. 1760, 1959. "Marl began to accumulate about 14,000 years ago, as determined by radiocarbon dating, in a pond in a kettle hole in Kent drift at Corry, Pa., nine miles inside the Wisconsin drift margin. This radiocarbon age represents the minimum time since the disappearance of the ice from Corry and confirms an assignment of Cary age to the drift."

DUECKER, JOHN C.

1. Gravity traverse in northeastern Pennsylvania. M. S. thesis, Pa. State Coll., 1952; Am. Geophys. Union Trans., v. 35, p. 503-507, illus., 1954. A traverse from Tioga, Bradford Co. eastward through Susquehanna Co. to the state boundary in Wayne Co. is described. A regional Bouguer gravity increase eastward of 70 milligals, and a local anomaly of 15 milligals near Montrose, Susquehanna Co., are shown.

DUERSMITH, LEONARD JOHN

1. Wood's Chrome Mine, Lancaster County, Penna.: Rocks and Minerals, v. 26, p. 243-247, illus., 1951. A description of the property and a list of the minerals are given.

DUMBLE, EDWIN THEODORE, 1852-1927

1. Memorial of Anthony Wayne Vodges [1843-1923]: Geol. Soc. America Bull., v. 35, p. 37-42, port., 1924.

DUNBAR, CARL OWEN

1. Charles Schuchert [1858-1942]: Am. Phil. Soc. Yearbook 1942, p. 374-377, 1942; Geol. Soc. America Proc. 1942, p. 217-240, port., 1943; Science, v. 97, p. 301-303, 1943; Jour. Paleontology, v. 17, p. 219-220, port., 1943; Geol. Soc. London Quart. Jour., v. 99, p. lxxviii-lxxix, 1944.

DUNN, JOHN ROBERT

1. Lycippus Cave [Westmoreland Co.]: Netherworld News, Oct. 1955, p. [15 (‡], illus., 1955. A very brief description of the cave includes a sketch map.
2. Casparis Cave [Fayette Co.]: Speleo Digest 1956, pt. 1, p. 1-90 - 1-92 (‡), illus., 1957; reprinted *from* Netherworld News, v. 4, no. 10, 1956. A sketch map and description of a cave in Loyalhanna Limestone are given.
3. Jumonville Cave [Fayette Co.]: Speleo Digest 1956, pt. 1, p. 1-82 - 1-83 (‡), illus., 1957; reprinted *from* Netherworld News, v. 4, no. 3, 1956. A cave in the Loyalhanna Limestone is described and mapped.
4. (and Nelson, B. N., and Stone, R. W.). Ten new caves reported in 4 western counties: Pa. Dept. Internal Affairs Monthly Bull., v. 25, no. 4, p. 1-3, 21-25, illus., 1957. Small, undeveloped caves in Armstrong, Clarion, Fayette, and Westmoreland Cos. are described. A sketch map of Jumonville Cave, in Fayette Co., is included.
5. Frank's Cave [Fayette Co.]: Netherworld News, v. 6, p. 136, 138 (‡), illus., 1958; Speleo Digest 1958, pt. 1, p. 1-72 - 1-73 (‡), illus., 1959. The cave in Greenbrier Limestone is briefly described. A sketch map is included.

DUTCHER, RUSSELL RICHARDSON, *see also* Mansfield, S. P., 1.

1. (and others). The Pennsylvanian of western Pennsylvania, *in* Geol. Soc. America Guidebook for field trips . . . , p. 61-114. illus., 1959. A description of Pennsylvanian rocks, including a discussion of paleoecology, is followed by a detailed road log. The trip is from Pittsburgh to Clearfield Co., to Somerset Co., and back to Pittsburgh.

DUTTON, CARL EVANS, *see* Carr, M. E. S., 1.

DYSON, JAMES LINDSAY

1. Summary of the regional geology [eastern Pa.], *in* Guidebook, Field Conf. of Pa. Geologists 19th, [Easton, Pa. 1954] p. 1-6 (‡), illus., [1953]. A very generalized summary of the regional geology near Easton is given preceding a description of field trips.
2. The geologic column [eastern Pa.], *in* Guidebook, Field Conf. of Pa. Geologists 19th, [Easton, Pa. 1953] p. 7-18 (‡), [1953]. A brief, survey description of all of the formations in eastern Pennsylvania from Cambrian to Pleistocene age is given.
3. Relation of stratigraphy and structure to uranium occurrences near Mauch Chunk [Carbon Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 28, p. 124-134, illus., 1954; reprinted *as* Pa. Geol. Survey 4th ser., Inf. Circ. 5, 1955. Three locations are described. Despite severe folding and fracturing, the radioactive minerals are confined to very narrow stratigraphic limits. The narrow geographic limits suggest stream sedimentation control of some sort. The deposits are aligned and associated with faults, however, and the origin may have been hydrothermal, with selective precipitation within certain carbonaceous stratigraphic units.
4. Recumbent folding in the vicinity of Palmerton [Carbon Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 30, p. 137-141, illus., 1956. An apparent westward-plunging syncline and an adjacent anticline are actually part of the exposed inverted limb of a large recumbent anticline in which the strata are rotated more than 180°. The normal limb has been eroded away. Structural details are included.

EARDLEY, ARMAND JOHN

1. Structural geology of North America. 624 p., illus., New York, Harper and Bros., 1951. The Commonwealth is included in a review of the structure and stratigraphy of the Appalachian Mountains and the Piedmont area.
2. Tectonic divisions of North America: Am. Assoc. Petroleum Geologists Bull., v. 35, p. 2229-2237, illus., 1951; abridged, Tulsa Geol. Soc. Digest, v. 19, p. 60-67., illus., 1951. This is a generalized review of the tectonic divisions of the United States. The Commonwealth is in the Paleozoic orogenic belt.

EARL, KENNETH M.

1. Investigation of the Almedia lead-zinc deposit, Columbia County, Pa.: U. S. Bur. Mines Rept. Inv. 4743, 9 p. (‡), illus., 1950. Four holes, totaling over 1200 feet, were cored and logged. Galena and sphalerite, replacing limestone, occur along the contact of the Silurian Salina Limestone and the Devonian Bassardville Limestone. The cores are logged in condensed form.

2. Investigation of new Galena lead deposit, Bucks County, Pa.: U. S. Bur. Mines Rept. Inv. 4703, 7 p. (‡), illus., 1950. Galena and other minerals, associated with diabase intrusions, occur in Triassic shale. The ore is confined to shattered zones that have a definite trend. Condensed logs of the cores are presented; no ore-mineral occurs in economic quantity.
3. Investigation of Perkiomen Creek copper deposits, Montgomery County, Pa.: U. S. Bur. Mines Rept. Inv. 4666, 13 p. (‡), illus., 1950. The chief ore mineral, chalcopyrite, accompanies galena and sphalerite which are in quartz veins in Triassic shale. Diamond-drill cores are described.

EARLE, RAYMOND BARTLETT

1. The genesis of certain Paleozoic interbedded iron ore deposits [Union, Snyder Cos.]: N. Y. Acad. Sci. Annals, v. 24, p. 115-170, illus., 1914. The Silurian Clinton iron ore was formed by the precipitation of iron cement by ground water as it coursed through the sandstone.

EASTMAN, CHARLES ROCHESTER, 1868-1918

1. Carboniferous fishes from the central western states: Harvard Coll. Mus. Comp. Zool. Bull., v. 39, p. 165-225, illus., 1903. *Homocanthus acinaciformis* from Chemung beds in Warren Co. is described and illustrated.
2. Devonic fishes of the New York formations: N. Y. State Mus. Mem. 10, 235 p., illus., 1907. Eleven species from Tioga, Bradford, and Warren Cos. are described and illustrated. A Silurian fish from Perry Co. is also included.

EAVANSON, HOWARD NICHOLAS

1. The Pittsburgh coal bed—its early history and development. 55 p., illus., New York, Am. Inst. Min. and Metall. Engineers, 1938. There is very little geologic information in the text, but maps, analyses, and other data are included. The history of the deposit is fascinating.
2. The first century and a quarter of American coal industry. xiv, 701 p., illus., Pittsburgh, privately printed, 1942. In a detailed historical account of the development of the coal industry, much reference is made to the Commonwealth.

EBAUGH, WILLIAM CLARENCE, *see* Wright, F. J., 1.

EBRIGHT, JOHN RICHARD

1. The westward limitation of the Appalachian folding in the Appalachian foreland. M. S. thesis, Univ. Pittsburgh, 1948.
2. (and Ingham, A. I.). Geology of the Leidy gas field and adjacent areas, Clinton County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. M 34, 35 p., illus. incl. geol. maps, 1951. Devonian-Pennsylvanian rocks are discussed and mapped. The structure, essentially a dome on the Wellsboro Anticline, contains gas in the Oriskany Sandstone. The Kettle Creek and Clearfield-McIntyre Synclines flank the Wellsboro Anticline. Geological and structural contour maps are included.
3. (and Ingham, A. I.). Preliminary report, Leidy gas field and adjacent areas, Clinton County, Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 134, map, Scale 1 inch to 2000 feet, with text, 1951. A structure-contour map on a conglomerate bed in the Pocono Formation is shown. The northwest corner of Clinton Co. and adjacent Potter and Cameron Cos. are included on the map. The Wellsboro Anticline contains the Leidy Dome. Devonian-Pennsylvania rocks are briefly described, as are the structures of the area. Well-log data are tabulated.
4. The Hyner and Ferney Anticlines and adjacent areas, Centre, Clinton and Lycoming Counties, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. M 35, 32 p., illus., 1952. Devonian-Pennsylvanian rocks are described. The anticlines and synclines of the area are delineated and discussed. Well records are summarized, and descriptions of a few key well-logs are given. Sections are measured.

ECKEL, EDWIN CLARENCE, 1875-1941

1. Building stones and clays—their origin, characters, and examination, xiv, 264 p., illus., New York, John Wiley and Sons, 1912. This is essentially a textbook, but it contains many analyses of rocks from the Commonwealth.
2. Iron ores—their occurrence, valuation, and control; 1st ed. xvii, 430 p., New York, McGraw Hill Book Co., 1914. A textbook includes descriptions

of the residual and magnetite ore bodies of southeastern Pennsylvania and the carbonate ores of western Pennsylvania. No new data are included.

EDELSTEIN, YA. S.

1. [William Morris Davis, 1850-1934]: Problemii Fiziocheskoi Geografii, v. 2, p. 43-52, Leningrad, Akad. Nauk, 1935. [in Russian]

EDIE, RALPH W.

1. Analyses of some North American diabases: Canadian Min. and Metall. Bull., v. 46, p. 487-489, illus., 1953; Canadian Inst. Mining and Metallurgy Trans., v. 56, p. 247-249, illus., 1953. Analyses of the copper, cobalt, and nickel content of three diabase bodies near Cornwall, Lebanon Co., are included.

EDWARDS, JAY

1. From quarry face to dome pit [Huntingdon Co.]: Nittany Grotto Newsletter, v. 5, no. 8, p. 3, 6 (‡), illus., 1957. A description of McConnellstown Quarry Cave includes a sketch map. It is in Helderberg Limestone.
2. Kooken Cave [Huntingdon Co.] (Pennsylvania): Speleo Digest 1957, pt. 1, p. 1-56, 1-57, 1-58 (‡), illus., 1958; reprinted *from* Nittany Grotto Newsletter, v. 5, no. 9, p. 6, 1957. A large cave in Ordovician limestone is described; a sketch map is included.
3. McConnellstown Quarry Cave . . . Huntingdon County: Nittany Grotto Newsletter, v. 6, p. 11-12 (‡), illus., 1957; Speleo Digest 1957, pt. 1, p. 1-54 (‡), 1958. A brief description of this cave, in steeply dipping Helderberg Limestone, includes a sketch map.

EINECKE, GUSTAV

1. Die Eisenerzevarraete der Welt. 418 p., illus. incl. atlas, Dusseldorf, Stokleisen, 1950. A review of world-wide occurrences of iron ore includes some of those of the Commonwealth. The Cornwall iron ore deposit in Lebanon Co., the Clinton strata, and residual ore occurrences are very briefly described. Analyses are included.

EISELEY, LOREN COREY

1. Charles Lyell [1797-1875]: Sci. American, v. 201, no. 2, p. 98-106, illus. incl. port., 1959.

ELLER, EUGENE RUDOLPH

1. Chemung fauna from Canoe Camp Creek near Mansfield [Tioga Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1932.

ELLICOTT, ANDREW

1. Miscellaneous observations relative to the western parts of Pennsylvania, particularly in the neighborhood of Lake Erie [Erie Co.]: Am. Phil. Soc. Trans., v. 4, p. 224-229, [1795] 1799. Horizontal strata are described, and conclusions refer to "those terrible convulsions" elsewhere in the Commonwealth.

ELLISHER, ANNE M., *see* White, W. B., 3.

EMERSON, BENJAMIN KENDALL, 1843-1932

1. William Bullock Clark (1860-1917): Am. Acad. Arts and Science Proc., v. 54, p. 412-415, 1919.
2. James Furman Kemp, 1859-1926: Am. Acad. Arts and Science Proc., v. 63, p. 462, 1929.

EMERY, J. R.

1. (and Griffiths, J. C.). Reconnaissance investigation into relationships between behavior and petrographic properties of some Mississippian sediments: Pa. State Coll. Mineral Industries Exper. Sta. Bull. 62, p. 67-80, illus. [1953]. Statistical analyses of petrographic properties of 16 samples of "Pocono" Formation were made in order to determine the degree of variation shown by a random set of samples.

EMMONS, EBENEZER, 1799-1863

1. Geological report of the Midland Counties of North Carolina. 352 p., illus., New York and Raleigh, 1856. *Clepsysaurus pennsylvanicus* from Triassic rocks of Lehigh Co. is discussed and illustrated.

EMMONS, RICHARD CONRAD

1. Memorial of Alexander Newton Winchell [1874-1958]: Am. Mineralogist, v. 44, p. 380-385, port., 1959.

EMMONS, WILLIAM HARVEY, 1876-1948

1. Geology of petroleum. 2d ed. 736 p., illus., New York, McGraw-Hill Book Co., 1931. A survey of the Appalachian oil fields includes those of the Commonwealth. No new data are given.
2. Memorial of Warren Upham [1850-1934]: Geol. Soc. America Proc. 1934, p. 281-294, port., 1935.

ENGEL, GEORGE W.

1. A description of a peculiar fault in the Mammoth coal bed, Panther Creek Basin [Carbon Co.], Pennsylvania: Colliery Engineer, v. 18, p. 100, illus., 1898. A peculiar structure, previously interpreted as some sort of fault, is shown to have resulted from pre-Appalachian-Revolution-folding and faulting. The data are not very clear.

ENGMAN, HARRY ARTHUR

1. An insoluble residue study of the Allentown Formation, near Bethlehem [Northampton Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1951.

EVANS, LEWIS, 1700-1756.

1. A map of Pensilvania, New Jersey, New York . . . . Scale about 1 inch to 20 miles, Philadelphia, L. Hebert, Sculpt., 1749; also a 1752 edition and a later, revised edition. A map includes some of the physiographic features of eastern Pennsylvania. A few references to mineral deposits are included. This is one of the first published maps of the Commonwealth showing any geological features.
2. A general map of the Middle British Colonies . . . . Scale, about 1 inch to 40 miles, Philadelphia, priv. pub. 1755; also other editions. A map includes the Commonwealth. Physiographic features and a few notations regarding mineral locations are included.
3. A map of North America showing the places where the metals, minerals, fossils and medicinal waters are to be found . . . . No scale, about 12x12 inches, *in* Literary Mag., v. 1, after p. 294, London, 1757. An editorial review of Lewis Evans' map of the Middle British Colonies includes a small reproduction of a map which greatly resembles one prepared by Guettard somewhat earlier. The location of rock oil is noted in Pennsylvania.

EVERHART, GAIL MIRIAM

1. Map of northern part of Appalachian Basin showing location of selected deep wells: U. S. Geol. Survey Oil and Gas Inv. Map OM 136. Scale 1 inch to about 15 miles, 1953.

EWING, DAVID JAY

1. A study of the thinning effect of faults of a geologic section near Bedford [Bedford Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1952.

EWING, WILLIAM MAURICE

1. (and Press, F.). The United States, Part 3 *of* Determination of crustal structure from phase velocity of Rayleigh waves: Geol. Soc. America Bull., v. 70, p. 229-244, illus., 1959. The Commonwealth is included in a discussion of the relationship of Rayleigh waves to topography, crustal thickness, and structure. The crustal thickness is about 40 km.

FAIRALL, VIRGINIA, *see* Fettke, C. R., 39; Seifert, W. H., 1.

FAIRCHILD, HERMAN LEROY, 1850-1943

1. On the structure of *Lepidodendron* and *Sigillaria* [Lackawanna, Luzerne Cos.]: N. Y. Acad. Sci. Annals, v. 1, p. 41-45, 77-91, 129-133, illus., 1877-78. Specimens from the anthracite basins are used as examples to show variations in the taxonomic groups.
2. Glacial waters in the Lake Erie basin: N. Y. State Mus. Bull. 106, 86 p., illus., 1907. Bars, built by Lake Warren on the Twentymile Creek delta, occur in Erie Co. Other shoreline features of Lakes Warren and Whittlesey are described.
3. Pleistocene uplift of New York and adjacent territory: Geol. Soc. America Bull., v. 27, p. 235-262, 1916; abstract, with discussions by J. W. Spencer and R. D. Salisbury, p. 66-67. Isobase maps (equal uplift) include northern Pennsylvania. A line of no uplift runs from Crawford Co. southeastward to Bucks Co., and the 100 foot increase contour passes from Tioga Co. southeastward to Pike Co. None of the data came from the Commonwealth.
4. Edwin Eugene Howell [1845-1911]: Rochester Acad. Sci. Proc., v. 5, p. 259-261, 1919.

5. Grove Karl Gilbert [1843-1918]: Rochester Acad. Sci. Proc., v. 5, p. 251-259, port., 1919.
6. Henry Augustus Ward [1834-1906]: Rochester Acad. Sci. Proc., v. 5, p. 241-251, port., 1919.
7. Thomas Chrowder Chamberlin [1843-1928]—teacher, administrator, geologist, philosopher: Science, v. 68, p. 610-612, 1928.

FANSHAWE, JOHN RICHARDSON

1. A microscopical study of coal. Pennsylvania anthracite and West Virginia coking coals. Ph.D. thesis, 112 p., illus., Univ. Lille, France, 1930. Microscopic studies show that anthracite coal has a similar origin as that of bituminous coal, i. e., the compositions are the same. The anthracite samples come from several locations in the Commonwealth. Polished sections are studied. Spores, wood, and other features are used for comparison. Several conclusions are drawn, the most significant ones of which are: (1) the coal is allochthonous, (2) mechanical classification and bacterial action are important in the determination of the composition, and (3) original composition and pressure are the most important factors of coal evolution.

FARRELL, MICHAEL

1. (and Turner, H. S.). Bacteria in anthracite coal [Schuylkill Co.]: Jour. Bacteriology, v. 23, p. 155-162, illus., 1932. Fractured and unfractured samples are collected from a drift about 350 feet underground. Common bacteria occur in the fractured coal; the compact coal is barren.

FARRINGTON, OLIVER CUMMINGS, 1864-1933

1. James D[wight] Dana [1813-1895] as a teacher of geology: Jour. Geology, v. 3, p. 335-340, 1895.
2. Catalogue of the collection of meteorites, May 1, 1903: Field Columbian Mus. Pub. Geol. Ser. 2, p. 79-124, illus., 1903. Brief descriptions of the Mount Joy, Adams Co., and the Millers Run, Allegheny Co., meteorites are given. Fragments are in the Chicago museum.
3. Catalogue of the meteorites of North America to January 1, 1909: Natl. Acad. Sci. Mem., v. 13, 513 p., illus., 1915. Meteorites from Lycoming, Adams, and Allegheny Cos. are described and analyzed.
4. Tribute to George Perkins Merrill [1854-1929]: Geol. Soc. America Bull., v. 41, p. 27-29, 1930.

FEARON, HENRY BRADSHAW, 1770-

1. Sketches of America . . . . 2d ed., 454 p., illus., London, Longman, Hurst *et al.*, 1818; 3d ed., 1819. A narrative of a stage trip from Philadelphia to Pittsburgh describes the physiography and some of the mineral resources of the Commonwealth.

FEATHERSTONHAUGH, GEORGE WILLIAM, 1780-1866.

1. *Rhinoceroides alleghaniensis* [Somerset Co.]: Monthly Am. Jour. Geology, v. 1, p. 10-12, illus., 1831; discussion by C. S. Rafinesque, with title, On the false *Rhinoceroides* . . . , Atlantic Jour. and Friend of Knowledge, v. 1, p. 114-115, 1832; discussion by R. Harlan, *in* his Medical and physical researches, p. 268, Philadelphia, Lydia Bailey, 1835. A rhinoceros-jaw fragment containing two teeth is described and illustrated from a soil zone above Turkey Foot. "The superficial soil rests on [Mississippian] grit." Its antiquity is not considered. Rafinesque calls it a weathered sandstone boulder. Harlan is non-committal.
2. Report of a geological reconnaissance made in 1835 from the seat of government . . . to Coteau de Prairie. 160 p., illus., Washington, D. C., Gales and Seaton, 1836. This is a running account of a trip which passed from Cumberland, Maryland, north to Bedford, Pa., northwestward to Pittsburgh, and then down the Ohio River. Geography and geology are described. He considers the bituminous coal to be Silurian in age.

FELDMAN, JULIAN

1. (and Scarpino, L., and Pantazoplos, C., and Orchin, M.). Composition of crude oil from the Bradford Field [McKean Co.], Pennsylvania: Producers Monthly, v. 16, no. 6, p. 14-16, 1952.

FENNEMAN, NEVIN MELANCTHON, 1865-1945.

1. Physiographic boundaries within the United States: Assoc. Am. Geographers Annals, v. 4, p. 84-134, illus., 1914. A review of the physiographic provinces of the United States includes those in the Commonwealth.

2. (and others). [Map of] Physical divisions of the United States. Scale 1:7,000,000, U. S. Geol. Survey, 1930.
3. Problem in the correlation of erosion surfaces [abs.]: Geol. Soc. America Proc. 1933, p. 78, 1934; discussion by W. W. Atwood, G. H. Ashley, C. L. Dake, F. E. Matthes, and K. C. Heald, p. 78-80, 1934.

FENTON, CARROLL LANE
1. (and Fenton, M. A.). Studies of fossil calcareous algae [abs.]: Geol. Soc. America Proc. 1936, p. 354, 1937.

FENTON, MILDRED ADAMS, *see* Fenton, C. L.,1.

FERGUSON, HARRY F.
1. (and Philbrick, S. S.). Faulting in engineering structures located in the Allegheny Plateau [Allegheny Co.] [abs.]: Geol. Soc. America Bull., v. 70, p. 1601-1602, 1959.

FERGUSON, J. HENRY
1. The Southampton Coal Basin, Somerset Co., Pa. . . . . 13 p., illus., [Baltimore], Sun Book Printing Co., 1871. This is a report designed as a prospectus. The area, just north of Cumberland, Maryland, has coal, iron ore, and limestone present. All are described. Coal analyses are given also.

FERM, JOHN C., *see also* Dutcher, R. R., 1; Swartz, F. M., 2.
1. Megaspores of the Middle (?) Kittanning coal in Beaver County, Pennsylvania [abs.]: Am. Jour. Botany, v. 37, p. 672-673, 1950.
2. Radioactivity of coals and associated rocks in Beaver, Clearfield, and Jefferson Counties, Pennsylvania: U. S. Geol. Survey Trace Elem. Inv. 468, 52 p.. illus., 1955. Over 160 samples from 56 locations were examined for radioactive minerals. Six of the locations have higher counts than all of the rest. The U content ranges from .014 to .002 percent for the best locations. The Lower Freeport coal has the greatest radioactivity. Underclays have higher U contents than coals. The data are tabulated.
3. (and Huddle, J. W.). Slumps and mud flows in rocks of Pennsylvanian age in the Appalachian Plateau [abs.]: Econ. Geology, v. 50, p. 775, 1955: Geol. Soc. America Bull., v. 66, p. 1557, 1955.
4. Petrology of the Kittanning Formation near Brookville [Jefferson Co.], Pennsylvania. Ph.D. thesis, Pa. State Univ., 1957; [abs.], Dissert. Abs., v. 17, p. 3034-3035, 1957; Geol. Soc. America Bull., v. 70, p. 1602, 1959.

FETTKE, CHARLES REINHARDT, 1888-1959, *see also* Cathcart, S. H., 2; Seifert, W. H., 1; Sherrill, R. E., 1.
1. Glass sands: Am. Ceramic Soc. Trans., v. 19, p. 160-194, illus., 1917. A detailed discussion of glass sands in general includes descriptions of several from the Commonwealth which are used as examples showing certain properties.
2. Pennsylvania, *in* [Oil and gas] Developments in Appalachian area during 1940: Am. Assoc. Petroleum Geologists Bull., v. 25, p. 1137-1144, illus., 1941. Petroleum and gas activity for the year is presented, partly in table form.
3. (and Dickey, P. A.). Pennsylvania, *in* [Oil and gas] Developments in Appalachian area during 1941: Am. Assoc. Petroleum Geologists Bull., v. 26, p. 1114-1123, illus., 1942; . . . 1942, v. 27, p. 838-847, illus., 1943. Production data for the year and some geologic information are shown in tables.
4. Pennsylvania, *in* [Oil and gas] Developments in Appalachian area in 1943: Am. Assoc. Petroleum Geologists Bull., v. 28, p. 726-734, illus., 1944; . . . 1944, v. 29, p. 671-679, illus., 1945; . . . 1945, v. 30, p. 866-871, illus., 1946; . . . 1946, v. 31, p. 963-970, illus., 1947. The year's petroleum and gas production data are given in part on tables.
5. [Oil and gas] Developments in Pennsylvania in 1947: Am. Assoc. Petroleum Geologists Bull., v. 32, p. 897-906, illus., 1948; . . . 1948, v. 33, p. 841-847, illus., 1949. Oil and gas drilling and production data are presented largely in tables.
6. Arthur E. Matteson No. 1 Well [Potter Co.], Potter Development Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 9 p., 1949. The well is 5561 feet deep. It begins in Upper Devonian rock and ends in the Silurian Bertie Limestone.
7. Central Pennsylvania Lumber Company No. 1 Well [McKean Co.], Penn-Bradford Oil Company: Pa. Geol. Survey [4th ser.] Well-Sample Record,

6 p., 1949. The well is 4146 feet deep; it starts in Upper Devonian rocks and ends in the Silurian Cobleskill Limestone.

8. Charles Erickson No. 1 Well [Warren Co.], C. E. Updegraff, et al.: Pa. Geol. Survey [4th ser.] Well-Sample Record, 14 p., 1949. The well is 5630 feet deep, starts in Pleistocene material, passes into Devonian rocks, and ends in the Ordovician Queenston Shale.
9. E. A. Williams No. 1 Well [McKean Co.], Hiawatha Oil and Gas Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 10 p., 1949. The well is 4448 feet deep, starts in Upper Devonian rocks, and ends in the Silurian Cobleskill Limestone.
10. E. Collins No. 1 Well [Forest Co.], W. C. Wasson, et al.: Pa. Geol. Survey [4th ser.] Well-Sample Record, 13 p., 1949. The well is 5349 feet deep, starts in Pennsylvanian rocks, and ends in the Devonian Helderberg Limestone.
11. Frances Miles No. 3 Well [Erie Co.], New Penn Development Corporation: Pa. Geol. Survey [4th ser.] Well-Sample Record, 9 p., 1949. The well, 2575 feet deep, passes through Pleistocene material, into and through Devonian rocks, and down to the Ordovician Queenston Shale.
12. G. H. Hettrick No. 1 Well [Bradford Co.], Penn-York Natural Gas Corporation: Pa. Geol. Survey [4th ser.] Well-Sample Record, 9 p., 1949. The well is 5227 feet deep, starts in Devonian rocks, and ends in the Oriskany Sandstone.
13. Ida Wheeler No. 1 Well [Tioga Co.], Lycoming Natural Gas Corporation: Pa. Geol. Survey [4th ser.] Well-Sample Record, 7 p., 1949. The well is 5663 feet deep, starts in Upper Devonian rocks, and ends in the Helderberg Limestone.
14. Jay Childs No. 1 Well [Erie Co.], Ohio Oil Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 14 p., 1949. The well has a depth of 5191 feet, starts in Pleistocene material, and ends in the Cambrian Gatesburg Sandstone.
15. Jessie G. Hockenberry No. 1 Well [Butler Co.], Manufacturers Light and Heat Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 28 p., 1949. The well, 10,096 feet deep, starts in Pleistocene material and passes from Pennsylvanian rocks downward to the Cambrian Gatesburg Formation.
16. Kinzua Valley Chemical Company No. 1 Well [McKean Co.]., Appalachian Development Corporation: Pa. Geol. Survey [4th ser.] Well-Sample Record, 8 p., 1949. The well is 3845 feet deep; it begins in Upper Devonian rocks and ends in the Oriskany Sandstone.
17. L. E. Mallory and Son No. 1 Well [McKean Co.], Appalachian Development Corporation: Pa. Geol. Survey [4th ser.] Well-Sample Record, 9 p., 1949. The well is 4406 feet deep. It starts in Upper Devonian rocks and ends in the Oriskany Sandstone.
18. L. E. Mallory and Son No. 1 Well [McKean Co.], Hiawatha Oil and Gas Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 7 p., 1949. The well is 4241 feet deep; it starts in Upper Devonian rocks and ends in Oriskany Sandstone.
19. Lessor and Launer No. 1 Well [Warren Co.], H. C. Drilling Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 11 p., 1949. The well is 4689 feet deep, starts in the Mississippian System, and ends in the Devonian Oriskany Sandstone.
20. Lessor and Launer No. 1 Well [Warren Co.], Potter Development Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 14 p., 1949. The well is 4928 feet deep, starts in Mississippian rocks, and ends in the Silurian Salina Group.
21. Lyle E. Shoemaker No. 1 Well [Tioga Co.], Lycoming Natural Gas Corporation: Pa. Geol. Survey [4th ser.] Well-Sample Record, 11 p., 1949. A 7148-foot deep well starts in Devonian strata and ends in the Silurian Vernon Shale.
22. M. Zerbe Well [McKean Co.], Potter Development Company, Serial No. 1165: Pa. Geol. Survey [4th ser.] Well-Sample Record, 12 p., 1949. The well is 5135 feet deep; it starts in Upper Devonian rocks and ends in the Silurian Salina Group.
23. N. Blickensderfer No. 22 Well [Erie Co.], The Ohio Oil Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 9 p., 1949. The well is 4457 feet deep,

starts in Pleistocene material, and passes from Devonian rocks down to the Ordovician Trenton Limestone.

24. Spetz No. 1 Well [Warren Co.], Potter Development Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 16 p., 1949. The well starts in Mississippian rocks, descends 5165 feet, and ends in the Ordovician Queenston Shale.
25. State of Pennsylvania No. 2 Well [Potter Co.], Godfrey L. Cabot, Inc.: Pa. Geol. Survey [4th ser.] Well-Sample Record, 14 p., 1949. The well is 6314 feet deep; it starts in Upper Devonian rocks and ends in the Oriskany Sandstone.
26. Warrant 3416 No. 4 Well [McKean Co.], South Penn Oil Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 14 p., 1949. The well, 4898 feet deep, starts in Pennsylvanian rocks and ends in the Devonian Oriskany Sandstone.
27. Benjamin Haywood No. 1 Well [McKean Co.], Atlantic Seaboard Natural Gas Company, Inc.: Pa. Geol. Survey [4th ser.] Well-Sample Record, 10 p., 1950. The well is 5269 feet deep. It starts in Upper Devonian rocks and ends in the Silurian Salina Group.
28. [Oil and gas] Developments in [western] Pennsylvania in 1949: Am. Assoc. Petroleum Geologists Bull., v. 34, p. 1048-1057, illus., 1950. This is a progress report of oil and gas development in the Commonwealth during the year. Tables are given.
29. E. A. Williams No. 1 Well [Warren Co.], Appalachian Development Corporation: Pa. Geol. Survey [4th ser.] Well-Sample Record, 9 p., 1950. A well, over 3500 feet deep, starts in Pleistocene material, passes into Upper Devonian rocks, and ends in the Devonian Helderberg Limestone.
30. Glenn Taylor No. 1 Well [McKean Co.], New Penn Development Corporation, Serial No. 1649: Pa. Geol. Survey [4th ser.] Well-Sample Record, 11 p., 1950. The well is 4701 feet deep, starts in Upper Devonian rocks, and ends in the Silurian Salina Group.
31. Henderson Dome, a unique structure in [Mercer Co.] northwestern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 61, p. 1458, 1950.
32. L. D. Wilson No. 18 Well [McKean Co.], South Penn Oil Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 24 p., 1950. The well is 8002 feet deep, starts in Upper Devonian rocks, and ends in the Ordovician Reedsville Shale.
33. M. W. Jamieson No. 1 Well [Warren Co.], the Sylvania Corporation: Pa. Geol. Survey [4th ser.] Well-Sample Record, 17 p., 1950. A well, 4830 feet deep, starts in Pennsylvanian rocks and ends in the Devonian Helderberg Limestone.
34. Subsurface stratigraphic sections across the northern part of the Appalachian Basin [abs.]: Geol. Soc. America Bull., v. 61, p. 1566, 1950.
35. Warrant 3653, Pennsylvania Game Lands No. 1 Well [Elk Co.], Pennsylvania Gas Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 23 p., 1950. A well, 7546 feet deep, starts in Mississippian rocks and ends in the Ordovician Queenston Shale.
36. Water flooding in Pennsylvania, Chap. 36 *of* Secondary recovery in the United States, p. 413-444, illus., Am. Petroleum Inst., 1950; reprinted *as* Pa. Geol. Survey 4th ser., Bull. M 33, 1950. A brief summary of the petroleum occurrences in northern Pennsylvania is followed by an extensive discussion of water-flooding techniques used in secondary recovery; most of the work is done in the Bradford Field, McKean Co.
37. Well No. 3737, Warrant 3788 [Elk Co.], United Natural Gas Company: Pa. Geol. Survey [4th ser.] Well-Sample Record, 18 p., 1950. The well is 7930 feet deep, starts in Mississippian rocks, and ends in the Ordovician Queenston Shale.
38. [Oil and gas] Developments in [western] Pennsylvania in 1950: Am. Assoc. Petroleum Geologists Bull., v. 35, p. 1177-1187, illus., 1951; Pa. Geol. Survey 4th ser., Prog. Rept. 135, 10 p., illus., 1951. This is a progress report of the oil and gas production developments in the Commonwealth for the year. Tables are given.

39. (and Fairall, V.). Oil and gas field atlas of the Bradford Quadrangle [McKean Co.], Pennsylvania: Pa. Geol. Survey, 4th ser., Spec. Bull. 5 (Supp. to Bull. M 21), illus., 10 maps, text on cover, 1951. Detailed, large-scale maps show land boundaries, well locations, oil field boundaries, and other data. One structure contour map on the Bradford Third Sand is also included, as are tables of selected well records.
40. [Oil and gas] Developments in [western] Pennsylvania in 1951: Am. Assoc. Petroleum Geologists Bull., v. 36, p. 1047-1057, illus., 1952; Pa. Geol. Survey 4th ser., Prog. Rept. 139, 20 p., illus., 1952. This is a progress report of oil and gas production development in the Commonwealth during the year. Tables are given.
41. Tioga bentonite in Pennsylvania and adjacent states: Am. Assoc. Petroleum Geologists Bull., v. 36, p. 2038-2040, 1952. The appearance and distribution of a Devonian bentonite which occurs near the Onondaga-Hamilton contact are discussed.
42. Oil and gas developments in the Appalachian Basin, past and present: Mines Mag., v. 42, no. 11, p. 69-83, illus., 1952; reprinted *as* Pa. Geol. Survey 4th ser., Bull. M 37, 1953. A complete survey of the stratigraphy, structure, occurrence and development is given. The Commonwealth is included.
43. A. Pardee Estate No. 1 Well [Cameron Co.], Godfrey L. Cabot, Inc.: Pa. Geol. Survey [4th ser.] Well-Sample Record, 15 p., 1953. The well is 6794 feet deep, starts in Mississippian rocks, and ends in the Devonian Oriskany Sandstone.
44. [Oil and gas] Developments in [western] Pennsylvania in 1952: Am. Assoc. Petroleum Geologists Bull., v. 37, p. 1268-1279, illus., 1953; Pa. Geol. Survey 4th ser., Prog. Rept. 143, 30 p., illus., 1953. A review of new developments is given; tables show much data.
45. Richard Ellis Sherrill (1899-1952): Am. Assoc. Petroleum Geologists Bull., v. 37, p. 1534-1537, port., 1953.
46. [Oil and gas] Developments in [western] Pennsylvania in 1953: Am. Assoc. Petroleum Geologists Bull., v. 37, p. 1046-1056, illus., 1954; Pa. Geol. Survey 4th ser., Prog. Rept. 144, 15 p., illus., 1954. A review of oil and gas production developments for the year is given; a table is included.
47. Edge-water relations in Bradford Field [McKean Co.], Pennsylvania [abs.]: Oil and Gas Jour., v. 52, no. 50, p. 203, 1954; Am. Assoc. Petroleum Geologists Bull., v. 38, p. 1306-1307, 1954.
48. Structure-contour maps of the plateau region of north-central and western Pennsylvania: Pa. Geol. Survey 4th ser., Bull. G 27, v, 25 p., illus., 1954. Over 1000 wells have supplied the necessary information for a series of maps drawn on the top of the Oriskany Sandstone. The data are tabulated as well as plotted. Maps showing the surface structures are also included.
49. Bradford Oil Field [McKean Co.], (Pa. and N. Y.): Oil and Gas Compact Commission Committee Bull., v. 14, no. 1, p. 104-109, illus., 1955; reprinted *in* More oil for America, by The Interstate Oil Compact Commission, Okla. City, 1955. A complete description of the field is given, including structure contour maps, columnar sections, and correlations. The oil comes from Devonian sandstones. A brief description of the Hamilton Corners oil pool, in Venango Co., is appended.
50. (and Lytle, W. S.). [Oil and gas] Developments in [western] Pennsylvania in 1954: Am. Assoc. Petroleum Geologists Bull., v. 39, p. 811-821, illus., 1955; Pa. Geol. Survey 4th ser., Prog. Rept. 147, 12 p., illus., 1955. No gas or oil discoveries of major significance were made in 1954. The balance of tests and production is discussed. A table is included.
51. (and Lytle, W. S.). Pennsylvania oil and gas field development, 1954: Natl. Oil Scouts and Landsmen's Assoc. Yearbook 1955, v. 25, p. 665-675, illus., 1955. A statistical resumé of oil and gas activity in the Commonwealth is given in tables and charts.
52. Preliminary report, occurrence of rock salt in Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 145, maps with text, 1955. Maps show (1) the combined thickness of salt beds in the Salina Group of western Pennsylvania, and (2) the depth to the uppermost bed. Columnar sections and a brief text are also included.

53. (and Lytle, W. S.). [Oil and gas] Developments in [western] Pennsylvania in 1955: Am. Assoc. Petroleum Geologists Bull., v. 40, p. 1081-1091, illus., 1956; Pa. Geol. Survey 4th ser., Prog. Rept. 150, 10 p., illus., 1956. Drilling developments are reviewed; a table is included.

54. Pennsylvania *in* Underground storage of liquid petroleum hydrocarbons in the United States, p. 78-93, illus., Okla. City, The Interstate Oil Compact Commission, Research and Coord. Comm., 1956. Various geological possibilities are considered in connection with underground storage; they are natural caverns, abandoned mines and quarries, reservoir rocks of depleted oil pools, salt-solution cavities, and mines. A slate quarry in Northampton Co. is actually being used.

55. Summarized record of deep wells in [western] Pennsylvania: Pa. Geol. Survey 4th ser., Bull. M 31, iii, 148 p., illus., 1950; . . . 1950-54 Supp., Bull. M 39, iii, 114 p., illus., 1956. Data are given in tables for geography, stratigraphy, and results. Rocks from Cambrian to Permian age are included. Maps give well locations and the outlines and names of oil and gas pools. Some are detailed.

FIELD, RICHARD MONTGOMERY

1. The stratigraphy of the Middle Ordovician formations of central and south-central Pennsylvania. Ph.D. thesis, Harvard Univ., 1919.

FIELDNER, ARNO CARL, *see also* Porter, H. C., 1.

1. (and others). Analyses of mine and car samples of coal collected in the fiscal years 1911 to 1913: U. S. Bur. Mines Bull. 85 x, 444 p., 1914. Proximate and ultimate analyses of anthracite and bituminous coal from many parts of Pennsylvania are included.

2. (and others). Analyses of mine and car samples of coal collected in the fiscal years 1913 to 1916: U. S. Bur. Mines Bull. 123, xi, 478 p., 1918. Proximate and ultimate analyses of bituminous coal from many places in western Pennsylvaina are included.

3. (and Selvig, W. A., and Frederic, W. H.). Classification of typical coals of the United States, showing B. T. U. per pound on the moist, mineral-matter-free basis, plotted against fixed carbon on the dry, mineral-matter-free basis: U. S. Bur. Mines Rept. Inv. 3296 R, 21 p. (‡), illus., 1935; . . . 3296 A, 1 p. (‡), illus., 1936. Many samples from the Commonwealth, both anthracite and bituminous, are included

4. (and others). Carbonizing properties and petrographic composition of . . . Lower Freeport coal from eastern Indiana Co. near Cambria County, Pa.: U. S. Bur. Mines Tech. Paper 621, iii, 77 p., illus., 1941. Analyses and petrographic descriptions are given as well as are various other physical and chemical properties of the coal.

5. (and Rice, W. E., and Moran, H. E.). Typical analyses of coals of the United States: U. S. Bur. Mines Bull. 446, 45 p., 1942. A correlation of some of the coal beds of western Pennsylvania with those of nearby states is given, followed by analyses of samples from selected beds in the anthracite and bituminous coal regions.

FINCH, JOHN

1. Memoir on the new, or variegated sandstone of the United States: Am. Jour. Sci., v. 10, p. 209-212, 1826. The Commonwealth is implied in a discussion of the age of the [Triassic] sandstone in the eastern United States. Theretofore it was considered [Devonian]. Stratigraphical, physical, and paleontological data are used.

FINCH, WARREN

1. Uranium in terrestrial sedimentary rocks in the United States exclusive of the Colorado Plateau: U. S. Geol. Survey Prof. Paper 300, p. 321-327, illus., 1956. A brief summary is given of the uranium-mineral deposits in the Devonian and Pennsylvanian rocks of Carbon Co. The minerals in the Pottsville Formation are carnotite, tyuyamunite, and uranophane; those in the Catskill Formation are autunite, kasolite, and uranophane.

FISHER, GEORGE PARK, 1827-1909.

1. Life of Benjamin Silliman, [Sr.] . . . . 2 vols., 407, 408 p., illus. incl. ports., New York, C. Scribner and Co., 1866.

FISHER, JAMES R., *see* White, W. B., 2.

FISHER, LLOYD WELLINGTON, 1897-

1. Origin of chromite deposits: Econ. Geology, v. 24, p. 691-721, illus., 1929. A treatise includes a description of the occurrence of chromite at the Wood Mine in Lancaster Co. Saxonites, dunites, wehrlites, and websterites were the original rocks. Serpentinization followed, and the ore occurs as disseminations in the serpentine. Much of the chromite is late magmatic, although considerable hydrothermal chromite was brought in by the serpentinizing fluids.

FISHER, PAUL D.

1. Ohnmacht Cave [Berks Co.] (Pennsylvania): Speleo Digest 1957, pt. 1, p. 1-48 - 1-49 (‡), illus., 1958; Netherworld News, v. 5, no. 10, p. 149, 1957. A small cave in Cambro-Ordovician limestone is described. A sketch map is included.

FLECK, WILLIAM PYLE

1. Cyclic sedimentation in the lower Allegheny Series of the Kittanning area [Armstrong Co.]. M. S. thesis, Univ. Pittsburgh, 1953.

FLEISCHER, MICHAEL

1. A notable centenary in American mineralogy—Samuel Lewis Penfield, 1856-1906: Am. Mineralogist, v. 41, p. 139-143, port., 1956.

FLINT, NORMAN KEITH, *see also* Dutcher, R. R., 1.

1. A preliminary report of the geology of the Meyersdale [Somerset Co.], Pennsylvania, Quadrangle: Pa. Acad. Sci. Proc., v. 27, p. 130-135, illus., 1953. A complete geological description of the area is given in generalized form. Devonian-Pennsylvanian rocks are present; folds are the major structures. Bituminous coal, limestone, clay, and sandstone are the chief mineral resources.
2. Preliminary report, geology and mineral resources of southern Somerset County: Pa. Geol. Survey 4th ser., Prog. Rept. 149, geol. map with text, scale 1 inch to 1 mile, 1956. A structure contour map of the Upper Kittanning coal is included. Devonian-Pennsylvanian rocks are mapped. Coal is the chief resource, but clay, limestone, sandstone, shale, and natural gas are also present.

FLINT, RICHARD FOSTER

1. Beginning of the Pleistocene in eastern United States, *in* Colbert, E. H., ed., Pleistocene of the Great Plains [symposium]: Geol. Soc. America Bull., v. 59, p. 543-548, 1948. A discussion of the Pliocene-Pleistocene boundary includes a discussion of some of the gravel deposits in eastern Pennsylvania.
2. (Chairman, and others). Glacial map of the United States east of the Rocky Mountains. 1st ed., scale 1:1,750,000 (about 1 inch to 28 miles), 2 sheets, compiled and edited by a committee of the Div. Earth Sci., Natl. Research Council, New York, Geol. Soc. America, 1959.

FLOWER, ROUSSEAU HAYNER

1. Classification of Devonian nautiloids: Am. Midland Naturalist, v. 33, p. 675-724, illus., 1945. *Hipparionoceras* (?) *lairdi* from the Devonian Conewango Group in Fayette Co. is described and illustrated.

FLOWERS, RUSSELL R.

1. Lower Middle Devonian meta-bentonite in West Virginia [and southwestern Pa.]: Am. Assoc. Petroleum Geologists Bull., v. 36, p. 2036-2038, illus., 1952. Bentonite at the contact of the Huntersville Chert (Onondaga age) with the overlying Marcellus Shale is described. One occurrence is cited from an oil well in the Commonwealth.

FOERSTE, AUGUST FREDERICK, 1862-1936, *see also* Ulrich, E. O., 3, 6, 7.

1. Notes on Agelacrinidae and Lepadocystinae . . . : Denison Univ. Bull., Jour. Sci. Labs., v. 17, p. 399-488, illus., 1914. *Agelacrinites beecheri* from Mississippian rocks of Warren Co. is illustrated.
2. (and Teichert, C.). The actinoceroids of east-central North America: Denison Univ. Bull., Jour. Sci. Labs., v. 25, p. 201-296, illus., 1930. *Actinoceras bellefontense* and *A. lindenense* from Ordovician rocks in Centre Co. are described and illustrated.

FOLK, ROBERT LOUIS

1. Petrology of authigenic silica in the Beekmantown Group of central Pennsylvania. M. S. thesis. Pa. State Coll., 1950.
2. Petrology of Lower Ordovician cherts in central Pennsylvania [abs.]: Earth Science Digest, v. 4, no. 6, p. 16, 1950.

3. Petrology and petrography of the Lower Ordovician Beekmantown carbonate rocks in the vicinity of State College [Centre Co.], Pennsylvania. Ph.D. thesis, Pa. State Coll., 1952.

FOOSE, RICHARD MARTIN

1. Studies on the relationship between the chemistry of ground water, movement of ground water, and rock types [Dauphin Co.?]: Pa. Acad. Sci. Proc., v. 24, p. 151-154, 1950. Analyses of ground water from Ordovician limestone, Martinsburg shale, and Triassic sandstone, regarding pH and dissolved solids in p.p.m., show distinct differences in them. Such measurements, used as a mapping technique, could be used to reveal: (1) major formational contacts, (2) individual members within formations, (3) position of major structures, and (4) paths of ground water movement.
2. Ground water conservation and development [Dauphin Co.]: Pa. Dept. Internal Affairs Monthly Bull., v. 19, no. 2, p. 17-28, 1951. This is an account of the effects of the lowering of the water table in Hershey Valley. Sink holes developed rapidly; springs and wells dried up.
3. Relation of ground water temperature to movement: Pa. Acad. Sci. Proc., v. 26, p. 104-109, illus., 1952. Over 2000 measurements in wells in Cambrian and Ordovician rocks in southeastern Pennsylvania were made. Checks were made with dyes. There is a possibility that flowing ground water has a slightly lower (1-3°F) temperature. Other uses of temperature studies are suggested.
4. Ground-water behavior in the Hershey Valley [Dauphin, Lebanon Cos.], Pennsylvania: Geol. Soc. America Bull., v. 64, p. 623-645, illus., 1953. Large-volume pumping lowered the ground water table throughout the area. Systematic observations were made. Directions and velocity of flow are noted; sink holes become active.
5. Origine des gisements de minerai de fer le long de la partie la plus ancienne des monts Apalaches en Pennsylvanie, *in* Blondel, F., ed., La genèse des gîtes de fer: Internatl. Geol. Cong. 19th, Algiers 1952, C. R. sec. 10, p. 65-77, illus., Algiers, 1953. Iron ore along the edge of the Blue Ridge results from the concentration by ground water of the iron impurities which were in now-dissolved limestone and dolomite.

FORD, WILLIAM EBENEZER, 1878-1939.

1. Edward Salisbury Dana [1849-1935]: Science, v. 82, p. 342-344, 1935.
2. Memorial of Edward Salisbury Dana [1849-1935]: Am. Mineralogist, v. 21, p. 173-177, port., 1936.

FOSTER, WILLIAM B.

1. Reports upon coal property located . . . fourteen miles N. W. of Blairsville in Indiana County, Pennsylvania. 14 p., Philadelphia, Crissy and Markley, 1859. Letters from J. P. Lesley, R. M. S. Jackson, F. A. Genth, and W. H. Ellet discuss and describe the Pittsburgh coal. Analyses are included. This is designed for a prospectus.

FOURMARIER, PAUL F.

1. Essai sur la distribution, l'allure et la genese du clivage schisteux dans les Appalaches: Soc. géol. Belgique Mém., v. 60, p. 69-131, illus., Liege, 1936-37. A general discussion of slaty cleavage in the Appalachian Mountains includes illustrations drawn from the Delaware Water-Gap area. The effects of composition, energy involved, and stratigraphy are considered as factors in the development of cleavage. The last interval of folding is the preponderant cause of the observed cleavage. Tangential pressures are required also. Other lesser factors are discussed.

FOX, HAROLD D.

1. Structure and origin of two windows exposed on the Nittany Arch at Birmingham [Blair Co.], Pennsylvania: Am. Jour. Sci., v. 248, p. 153-170, illus., 1950. The Cambrian and Ordovician rocks exposed within the windows are overturned and have been graben-faulted. The overthrust has a low angle only in the area of the windows. Local synclinal folding and faulting were the origin of the present structures. A thrust fault of relatively small displacement occurred later.

FRANCIS, E. E., *see* Roy, R., 1.

FRANCIS, K.

1. (and Turner, T.). Miller Caves #5, #2, #3 . . . Centre County, Pa.: Speleo Digest 1958, pt. 1, p. 1-10 - 1-11 (‡), illus., 1959; expanded *from* Nittany Grotto Newsletter, v. 6, no. 5, 1958. A sketch map for Miller's Cave no. 1 is included.

FRANKS, PAUL C.

1. The Henry Shaler Williams camp in geology [Blair Co.]: Compass, v. 29, p. 279-280, 1952. The facilities of the Cornell University field camp are described. The geology is very cursorily mentioned.

FRAZER, PERSIFOR, JR., 1844-1909, *see also* Lyman, B. S., 3.

1. Report of progress in the district of York and Adams Counties: Pa. Geol. Survey 2d, C, viii, 198 p., illus. incl. geol. maps, 1876. A complete detailed description of the two counties is given. Cross sections of Precambrian-Tertiary rocks are included. Iron is the chief economic product. The ore is magnetite and residual limonite.
2. The geology of Lancaster County: Pa. Geol. Survey 2d, CCC, x, 350 p., illus. incl. atlas, 1880. A complete geologic description of the county is given. [Precambrian]-[Tertiary] rocks are mapped. Detailed cross sections along the Susquehanna River are included. The mineral deposits are: copper, nickel, magnesite, slate, serpentine, chromite, and iron. Analyses are made. The copper ore of Adams County is discussed in the appendix, and a map of York County is included.
3. Mémoire sur la géologie de la partie sudest de la Pennsylvanie. Sc.D. thesis, 177 p., illus. incl. geol. map, Univ. Lille, France, 1882. A complete description of the area southeast of, and including the Triassic rocks, is given. [Precambrian-Ordovician] [he considers the Cambrian rocks to be Lower Silurian]—Triassic rocks are described and mapped. Cross sections show the structural interpretations. Iron ore, igneous rocks, and limestones are analyzed.

FRAZIER, SAMUEL BOWMAN

1. The Morgantown Sandstone unconformity in the vicinity of Pittsburgh [Allegheny Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1950.

FREDERIC, W. H., *see* Fieldner, A. C., 3.

FREEDMAN, JACOB L.

1. Metamorphic rocks, Chap. 2 *of* Willard, B., Geology and mineral resources of Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. C 9, p. 13-22, 1959. Metamorphic rocks in the county are described in detail. The origin of the different formations is discussed. Most are Precambrian; some are of debatable age.

FRENCH, GORDON

1. Coal reserves of Somerset County, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1959.

FRIEDMAN, SAMUEL ARTHUR

1. Interbasin river systems superimposed on the major Pennsylvanian coal basins [abs.]: Geol. Soc. America Bull., v. 70, p. 1606, 1959.

FRONDEL, CLIFFORD

1. (and Palache, C.). Three new polymorphs of zinc sulfide [Allegheny Co.]: Am. Mineralogist, v. 35, p. 29-42, illus., 1950. Three polymorphs, wurzite-4 H, -6 H, and -15 R are described crystallographically and chemically.

FRONDEL, JUDITH WEISS

1. Dating the Wissahickon schist at Philadelphia [Philadelphia Co.], Pennsylvania [abs.]: Geol. Soc. America Bull., v. 62, p. 1550, 1951.

FUCHS, WALTER

1. (and others). Studies on fusain [Part] I *of* The chemistry of the petrographic constituents of bituminous coal: Pa. State Coll. Mineral Industries Exper. Sta. Bull. 23, 43 p., illus., 1938. [not seen]

FULLER, MYRON LESLIE

1. (and Lines, E. F., and Veatch, A. C.). Record of deep-well drilling for 1904: U. S. Geol. Survey Bull. 264, 193 p., 1905. The reasons for, and value of, collecting data are outlined, followed by tables giving locations, drilling data, type of wells, and remarks. Most are from Warren Co.

2. (and Sanford, S.). Record of deep-well drilling for 1905: U. S. Geol. Survey Bull. 298, 299 p., tables, 1906. A discussion of reasons for gathering data, and some associated problems, is followed by detailed well records from all the states including the Commonwealth.

FULTON, JOHN FARQUHAR

1. (and Thomson, E. H.). Benjamin Silliman, 1779-1864, pathfinder in American science. xiii, 294 p., illus., New York, Henry Schuman [c. 1947].

FURNISH, WILLIAM MADISON, *see* Ulrich, E. O., 6.

GADDESS, Jack, *see* Robinson, J. F., 2.

GAIR, JACOB E.

1. Some effects of deformation in the central Appalachians: Geol. Soc. America Bull., v. 61, p. 857-876, illus., 1950; correction with title, Calcite deformation in the Harpers Phyllite, v. 62, p. 325-326, 1951. Interpretations of deforming mechanisms are made from folded Cambrian to Devonian rocks. Some examples are drawn from Fulton Co.

GALPIN, SIDNEY L.

1. Studies of flint clays and their associates: Am. Ceramic Soc. Trans., v. 14, p. 301-346, illus., [1912]. Among others, the flint clay occurrences in Clarion and Clearfield Cos. are described. Petrographic descriptions and photomicrographs are included. Kaolin is the chief recrystallization mineral.

GARRETT, THOMAS H.

1. On minerals accompanying chromic iron: Am. Jour. Sci. 2d ser., v. 15, p. 332-334, 1853. Kaemmererite, bronzite, emerald nickel, and dolomite from the Wood Mine, in Lancaster Co., are described and analyzed.

GARTON, E. L., *see* Lane, E. C., 1.

GAUCHER, E. H. S., *see* Brummer, J. J., 1.

GAULT, HUGH RICHARD, *see also* Warmkassel, C. A., 1.

1. Metallic mineral reserves of Pennsylvania: Pa. Acad. Sci. Proc., v. 24, p. 208-214, illus., 1950. A general review of the occurrence of ore minerals in the Commonwealth is given. The reserves are mainly iron and zinc ores, and possibly aluminum ore. Several metals are recovered as by-products of the processing of the iron and zinc ores. Chromium, manganese, and nickel are minor materials.
2. Some chemical and mineral characteristics of carbonate rocks determined from chemical analyses [Berks, Bucks Cos.] [abs.]: Geol. Soc. America Bull., v. 61, p. 1464-1465, 1950.
3. (and Hamilton, C. L.). Partial log of a deep well, Freidenburg (Oley, P. O.), Berks County, Pennsylvania: Pa. Acad. Sci. Proc., v. 27, p. 146-153, illus., 1953. Detailed descriptions of samples from various depths within a well over 1100 feet deep are given. The well passed from the Martinsburg (?) Formation into crystalline rocks. Various interpretations are reviewed.
4. (and Dalhausen, J. K., and Yeakel, L.). Note on a partial section of the Pottsville-Mauch Chunk transition near Jim Thorpe [Carbon Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 31, p. 114-119, 1957. About 970 feet of cores are described in detail. The section represents the transition from Mississippian to Pennsylvanian time.
5. Mineral resources, Chap. 6 *of* Willard, B., Geology and mineral resources of Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. C 9, p. 185-218, illus., with sections by J. H. Goth, Jr. and E. W. Tooker, 1959. Sand and gravel, stone, limestone, ochre, clay, and silica are among the most important mineral resources. Iron, cement, lead, zinc, copper, barite, and gold are also known from Bucks Co.

GENTH, FREDERICK AUGUSTUS, 1820-1893, *see also* Hall, C. E., 1.

1. Geological report, *in* [Tennett, James] First report of the Board of Directors . . . of the Chester County Mining Company, May 1, 1851, p. 19-28, illus., Philadelphia, King and Baird, 1851. The ore-bearing veins are described. The veins intrude [Precambrian and Triassic] rocks, which are described also. Galena, anglesite, cerusite, pyromorphite, bornite, chalcopyrite, ysyrite, and sphalerite are all present.
2. Gersdorffite, [Part] 5 *of* Contributions to mineralogy: Am. Jour. Sci. 2d ser., v. 28, p. 248, 1859. Gersdorffite, encrusting on anglesite, from near Phoenixville, Chester Co., is described. Pholerite from Schuylkill Co. is also described and analyzed.

3. Millerite [Lancaster Co.], [Part] 5 *of* Contributions to mineralogy: Am. Jour. Sci. 2d ser., v. 33, p. 195, 1862. Millerite from the Gap Mine is described and analyzed.
4. Serpentine [Part] 13 *of* Contributions to mineralogy: Am. Jour. Sci. 2d ser., v. 33, p. 203, 1862. Serpentine occurs as an alteration of asbestos from Texas, Lancaster Co., crysotile, altered from asbestos, bronzite and actinolite, occurs in Delaware Co.
5. [No gold in Philadelphia sands] [abs.]: Am. Phil. Soc. Proc., v. 11, p. 439, 1871.

GEOLOGICAL SOCIETY OF AMERICA

1. (Dorf, E., editor). Guidebook for field trips, Atlantic City Meeting, 1957. 280 p., illus., incl. geol. maps, 1957; contains many papers, some of which are cited separately.

GEORGI, JOHANNES

1. William Herbert Hobbs [1864-] ein Klassiker der wissenschaftlichen Arktisforschung: Polarforschung, v. 3. p. 9-12, Goslar, 1951.

GERHARD, ROBERT C., *see* McLaughlin, D. B., 2.

GESNER, G. W.

1. Dr. Abraham Gesner [1797-1864]—a biographical sketch: Nat. Hist. Soc. New Brunswick Bull. 14, p. 3-11, port., St. John, 1896.

GEYER, ALAN RAYMOND, *see also* Gray, C., 12; Lapham, D. M., 4.

1. Geology of the vicinity of the Hershey Mine, Hershey [Dauphin Co.], Pennsylvania. M. S. thesis, Univ. Mich., 1956.
2. (and Gray, C.). Triassic Basin and Great Valley from Lancaster-Lebanon Interchange [Lancaster Co.] on the Pennsylvania Turnpike to Harrisburg [Dauphin Co.]: [Part I] *of* General geology of the Folded Appalachian Mountains of Pennsylvania, *in* Guidebook for field trips . . . , Field Trip no. 7, p. 233-241, illus., Pittsburgh Geol. Soc., 1957. A cursory description of Cambrian-Ordovician rocks includes a brief description of the structural geology of the region. Fossils are listed. A road log is included. The Cornwall Mine in Lebanon Co. is described.
3. (and others). Geology of Lebanon Quadrangle [Lebanon Co.]: Pa. Geol. Survey 4th ser., Geol. Atlas 167 C, Map with text, Scale about 2000 feet per inch, 1958. Cambrian, Ordovician, and Triassic rocks are mapped and described Magnetite, limestone, and limonite are the mineral resources present.

GIBBS, HARLEY S.

1. Coal moisture as a correlate of oil and gas occurrence in Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1932.

GIDDENS, PAUL H.

1. Pennsylvania petroleum 1750-1872, a documentary history. xv, 420 p., illus., Titusville, Pa., Pennsylvania Hist. and Mus. Commission, 1947. This is an historical account of the early days of petroleum activity in northwestern Pennsylvania. No geological information is included.

GILBERT, GROVE KARL, 1843-1918.

1. The strength of the earth's crust [abs.]: Geol. Soc. America Bull., v. 1, p. 22-25, 1890; discussions, p. 25-27.
2. Joseph Francis James, 1857-1897: Am. Geologist, v. 21, p. 1-11, port., 1898.
3. Israel Cook Russell, 1852-1906: Jour. Geology, v. 14, p. 663-667, port., 1906.

GILLESPIE, RUTH F.

1. Bartonian Foraminifera and ostracods. M. A. thesis, Cornell Univ., 1930.

GILLINGHAM, WILLIAM JAMES

1. Electrical logging in the Appalachian fields: Pa. State Coll. Mineral Industries Exper. Sta. Bull. 21, p. 30-52, illus., 1937. The principles of electrical logging are discussed. Examples of correlation are illustrated from the Oil City area in Venango Co. and the Bradford Oil Field, McKean Co.

GILMORE, CHARLES WHITNEY

1. Fossil snakes of North America: Geol. Soc. America Spec. Paper 9, 96 p., illus., 1938. *Coluber acuminatus, C.* sp., and *Natrix* sp., from the Pleistocene in Port Kennedy Cave in Montgomery Co., and *Thamnophis* sp., from the Pleistocene of a cave in Blair Co., are discussed.

GLASS, JEWELL JEANNETTE

1. (and Vlisidis, A. C., and Pearre, N. C.). Chromian antigorite from the Wood's Mine, Lancaster County, Pennsylvania: Am. Mineralogist, v. 44, p. 651-656, illus., 1959. Physical, optical, chemical, and x-ray analyses are made of this new variety.

GLENN, LEONIDAS CHALMERS, 1871-1951.

1. Denudation and erosion in . . . the Monongahela Basin [southwestern Pa.]: U. S. Geol. Survey Prof. Paper 72, 137 p., illus., 1911. Erosion effects resulting from deforestation are described.

GOEPPERT, JOHANN HEINRICH ROBERT, 1800-1884.

1. Fossilen Farrenkraueter: Nova Acta Acad. Leop.-Carol. Naturae-Curiosorum, v. 17, supp., 486 p., illus., Breslau, 1836. Fossil ferns from the Pennsylvanian rocks in the Commonwealth are included. Many are described and illustrated.
2. Fossile Flora der Uebergangsgebirge: Verhandl. K. Leop.-Carol. Akad. Naturforscher, v. 14, supp., 299 p., illus., Bonn u. Breslau, 1852. *Harlania halli,* from Silurian rocks in Pennsylvania, is described and illustrated; *Scolithus linearis,* from Cambrian rocks in Pennsylvania, is discussed. They are considered to be algae. *Sagenaria aculeata,* from [Devonian] rocks in Carbon Co. is also discussed.
3. Ueber die fossile Flora der Silurische, der Devonische, und unteren Kohlenformation . . . : Nova Acta Acad. Leop.-Carol. Naturae-Curiosorum, v. 27, p. 1-182, illus., Jena, 1859. Many specimens from the Commonwealth are included in this compendium. Some are illustrated.
4. Ueber die fossile Flora der silurischen, der devonischen, und unteren kohlen Formationen . . . : Nova Acta Acad. Leop.-Carol. Naturae-Curiosorum, v. 27, p. 427-606, illus., Dresden, 1859. *Sagenaria aculeata,* from [? Pennsylvanian] rocks in Carbon Co., near Mauch Chunk, is described and illustrated.

GOLDRING, WINIFRED

1. The Devonian crinoids of the State of New York: N. Y. State Mus. Mem. 16, 670 p., illus., 1923. *Poteriocrinus clarkei* and *P. c. alpha,* from Devonian rocks in Erie Co., and *Sphaerotocrinus ornatus* from the Lewistown Limestone near Frankstown, Blair Co., are described and illustrated.
2. Memorial to George Halcott Chadwick (1876-1953): Geol. Soc. America Proc. 1953, p. 101-106, port., 1954.
3. Memorial to Rudolph Ruedemann (1864-1956): Geol. Soc. America Proc. 1857, p. 153-161, port., 1958.

GOOD, H. G.

1. Amos Eaton (1776-1842), scientist and teacher of science: Sci. Monthly, v. 53, p. 464-469, 1941.

GOOD, RICHARD S.

1. A chromographic study of nickel in soils and plants at the Lancaster Gap Mine [Lancaster Co.], Pennsylvania. M. A. thesis, Pa. State Univ., 1955.

GOODE, G. BROWN

1. The [R. D.] Lacoe collection in the National Museum: Science new ser., v. 4, p. 8-10, 1896. The collection of paleobotanical material from the Commonwealth and elsewhere is described. It was given to the U. S. National Museum.

GOODLET, JOHN C.

1. Vegetation adjacent to the border of the Wisconsin Drift in Potter County, Pennsylvania: Harvard Forest Bull. 25, 93 p., illus., 1954. Studies of the botanical distribution and the rock and soil variations at the edge of the Wisconsin till indicate that with few exceptions, the present plant-distribution-pattern is similar on either side of the glacial border. This is due to the periglacial processes having created a soil south of the border which is like that north of the border. The forest was not present during glacial times so that periglacial action could take place. The vegetation reflects the surficial material, not the bedrock in this case.

GORDON, SAMUEL GEORGE, 1897-1952.

1. Crystallographic data on wavellite from Llallagua, Bolivia, and on cacoxenite from Hellertown [Northampton Co.], Pennsylvania [abs.]: Am. Mineralogist, v. 35, p. 132, 1950.

GORMAN, JOSEPH M.

1. Shafer Run Cave [Somerset Co.]: Pa. Acad. Sci. Proc., v. 13, p. 150-152, illus., [1939]. A cave in the Loyalhanna Limestone is described. A small-scale map is included. Running water seems to have been a big factor in the formation of the cave.

GOTH, J. H., *see* Gault, H. R., 5.

GOULD, LAURENCE McKINLEY

1. Memorial to William Herbert Hobbs (1864-1953): Geol. Soc. America Proc. 1953, p. 131-139, port., 1954.

GOUSE, HARRY V., *see also* Bolger, R. C., 5.

1. Subsurface structure of the Leidy gas field, Clinton County, Pennsylvania: Pa. Dept. Internal Affairs Monthly Bull., v. 20, no. 7, p. 18-21, illus., 1952. A brief summary of the stratigraphy of the Devonian System in the area is followed by a description of the field and a map. The field is located on a dome on the Wellsboro Anticline. Numerous reverse faults are present.

GRABAU, AMADEUS WILLIAM, 1870-1946.

1. (and Shimer, H. W.). North American index fossils: [Columbia Univ.] School of Mines Quart., v. 27, p. 138-248; v. 28, p. 20-100, 150-221, 251-352, illus., 1906-07; also as separate, 2 vols., 1262 p., illus., New York, A. G. Seiber and Co., 1910. Many species from many places and ages in the Commonwealth are included.
2. Ueber die Einteilung des nordamerikanischen Silurs: Internatl. Geol. Cong. 11th, Stockholm 1910, C. R., p. 979-995, illus., Stockholm, 1912. A generalized discussion of the Silurian System includes that of the Commonwealth. Sketches show the relationships of the various facies to one another. No new data are included.
3. Dr. Henry Fairfield Osborn [1857-1935]—an appreciation: Peking Nat. Hist. Bull., v. 10, p. 165-166, port., 1935.
4. The rhythm of the ages. 561 p., illus., Peking, H. Vetch, 1940. A textbook of world-wide historical geology uses many stratigraphic examples from the Commonwealth to support the Pulsation Theory of universal overlap and offlap during the Paleozoic Era.

GRAHAM, JACK BENNETT

1. Pennsylvania, *in* Water levels and artesian pressure in observation wells in the United States in 1945, Part 1, Northeastern states: U. S. Geol. Survey Water-Supply Paper 1016, p. 320-338, tables, 1947; . . . 1023, p. 336-359, tables, 1948. Ground-water-level fluctuations are recorded from many, but not all, counties. Levels below the surface and dates are given in tables.
2. Ground-water problems in the Philadelphia [Philadelphia Co.] area: Econ. Geology, v. 45, p. 210-221, illus., 1950. The Coastal Plain rocks are much better water-sources than the Piedmont rocks. One hundred ten million gallons per day are taken from Coastal Plain rocks, and 13 million gallons are taken from the Piedmont. The Raritan Formation is the chief aquifer. The large rivers are the chief rechargers. Other data are included.
3. Pennsylvania's water resources and water uses: Pa. Acad. Sci. Proc., v. 24, p. 220-229, 1950. This is a very generalized survey of the ground water occurrence, use, potential, and problems in the Commonwealth. No new data are included.

GRAHAM, THEODORE KINNE

1. Geology from Saylorsburg to Stormville [Monroe Co.] Pennsylvania. M. S. thesis, Lehigh Univ., 1959.

GRALENSKI, L. J., *see* Deevey, E. S., Jr., 1.

GRASTY, JOHN SHARSHALL, 1880-1930.

1. (and Maynard, T. P., and Washabaugh, M. W.). A report on the Jacob's Creek Oil Company's property [Fayette, Westmoreland Cos.] for the Pennsylvania Natural Gas and Refractory Company, 46 p., [n.p.] [1926]. The area, athwart Jacobs Creek, is described. The coal beds in the Pennsylvanian rocks are described. Limestone and clay are present but are not important. The subsurface Devonian-Mississippian rocks are evaluated, and since an anticline crest is on the property, natural gas is predicted. Measured sections are anticipated.

GRAY, CARLYLE, *see also* Geyer, A. R., 2, 3; Zietz, I., 1.

1. A structural problem near Evansville [Berks Co.], Penna.: Pa. Acad. Sci. Proc., v. 24, p. 170-175, illus., 1950. The local absence of the Jacksonburg Formation is explained, in part, by persistent thrust-faulting. The thrust plane is gently folded. Recumbent folds and/or stretch thrusts of moderate size locally increase the thickness of the Jacksonburg Formation. Sketch maps and cross sections are included.
2. Preliminary report on certain limestones and dolomites of Berks County, Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 136, 85 p., illus., 1951. Over 300 samples of Beekmantown, Annville, and Jacksonburg Limestones are analyzed. Brief descriptions of locations and an index map are also included. A brief stratigraphic summary is given.
3. The high calcium limestones of the Annville belt in Lebanon and Berks Counties, Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 140, 17 p., illus. incl. geol. maps, 1952. The Annville Limestone is 240 feet thick, and has uniformly high purity. Detailed maps show its distribution and reserves. Details of the complex structure are given.
4. The nature of the base of the Martinsburg Formation [southeastern Pa.]: Pa. Acad. Sci. Proc., v. 26, p. 86-92, illus., 1952. Detailed mapping along the Martinsburg-pre-Martinsburg Formation contact suggests that a period of erosion began after the Martinsburg shales began to be deposited, and that the remainder of the Martinsburg Formation was deposited on a surface of considerable relief. The pre-Martinsburg Ordovician limestone formations grade upward into the shale.
5. (and Prouty, C. E.). Cambro-Ordovician limestones of Lebanon County, *in* Field Conf. of Pa. Geologists 20th, Hershey 1954, p. 19-30 (‡), illus., [Harrisburg, Pa. Geol. Survey] [1954]. This is an annotated road itinerary for a visit to quarries and outcrops. Exposures of rocks from the Conococheague Limestone to the Hershey Limestone are visited. Numerous sketch maps and cross sections outline the complex structures.
6. Recumbent folding in the Great Valley [Lebanon Co.]: Pa. Acad. Sci. Proc., v. 28, p. 96-101, illus., 1954. Small sketch maps and cross sections illustrate overturned and recumbent folding near Schaefferstown. Careful analysis of detailed structural features is required as the recumbency is not easily recognizable.
7. (and Moseley, J. R., and McLaughlin, D. B.). Summary of regional geology [Lebanon Co.], *in* Field Conf. of Pa. Geologists 20th, Hershey 1954, p. 1-13 (‡), [Harrisburg, Pa. Geol. Survey] [1954]. Precambrian-Ordovician rocks are described. The structural geology of Lebanon Co. is briefly reviewed.
8. Trip I, Cornwall iron deposits [Lebanon Co.], *in* Field Conf. of Pa. Geologists 20th, Hershey 1954, p. 14-18 (‡), illus., [Harrisburg, Pa. Geol. Survey] [1954]. Magnetite, chalcopyrite, and pyrite are the chief ore minerals; gold and cobalt occur in the minerals. The ore body is a contact metamorphic deposit resulting from the invasion of Cambrian limestone by Triassic diabase. Local conglomerate beds of uncertain age and origin are associated with metamorphosed Martinsburg shale which overlies the Cambrian limestone. The ore is in the limestone. The conglomerate may be a tectonic breccia. The mineralization sequence is discussed.
9. (and Willard, B.). Stratigraphy and structure of lower Paleozoic rocks in [south]eastern Pennsylvania, *in* Field guidebook of Appalachian geology, Pittsburgh to New York, Mar. 1955, p. 87-92, Pittsburgh Geol. Soc., 1955. A generalized resumé of the Cambrian and Ordovician rocks along the route of a field trip is given.
10. Diabase at Cornwall [Lebanon Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 30, p. 182-185, illus., 1956. The diabase pluton is a spoon-shaped sheet, generally cross-cutting the country rock. It is 1100 feet thick. The typical mineralogy is discussed. It is composed essentially of calcic labradorite and pyroxene in nearly equal quantities.
11. Geological information in Pennsylvania for the highway engineers, *in* Annual [highway] geology symposium 8th, 7 p. (‡), Pa. State Univ., Pa. Dept. Hwys., [1957]. This is a summary of the types of geological literature, with emphasis upon that from Pennsylvania, and how it can be obtained and used by high-

way engineers. State and federal survey maps and reports are outlined, along with certain other non-public prepared data.

12. (and Geyer, A. R., and McLaughlin, D. B.). Geology of the Richland Quadrangle [Lancaster, Lebanon Cos.], Pennsylvania: Pa. Geol. Survey 4th ser., Geol. Atlas 167 D, map with text, scale about 2000 feet per inch, 1958. Cambrian, Ordovician, and Triassic rocks are mapped. Sections are measured. Limonite and limestone are the mineral resources mentioned. The structure of the area is described.
13. (and Socolow, A. A.). Mineral deposits of eastern Pennsylvania, *in* Geol. Soc. America Guidebook for field trips . . . , p. 143-166, illus., Atlantic City, N. J., 1959. Brief descriptions of the Annville and Cornwall areas in Lebanon Co. and the Friedensville and Slatedale areas in Lehigh Co. are given. Sketch maps are included.
14. Nappe structures in [southeastern] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1611, 1959.

GREAVES-WALKER, ARTHUR FREDERICK

1. The origin, mineralogy and distribution of the refractory clays of the United States: No. Car. Univ. Eng. Exper. Sta. Bull. 19, 87 p., illus., 1939. A general discussion of the origin of fire clays is followed by a review of clay occurrences in all of the states, including those of the Commonwealth. Few new data are included.

GREEN, JACOB, 1790-1841.

1. Monograph of the trilobites of North America. 93 p., illus., Philadelphia, J. Brano, 1832. *Dipleura dekayi,* from an unknown locality "near Lehighton", is described and illustrated. [Probably from Devonian rocks in Carbon Co.]. Another is from [Devonian?] rocks in Northumberland Co.

GREENMAN, DAVID WOLCOTT, *see also* Noecker, M., 1.

1. Ground water resources of Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. W 11, iv, 66 p., illus. incl. geol. map, 1955. The general geology of the county is discussed, with emphasis upon the water-bearing properties of the rocks. Precambrian-Ordovician, Triassic, and Cenozoic rocks are discussed. Analyses of water are included, as are well records. A geologic map of the county, with hydrologic data, is included.

GREENWALD, H. P.

1. (and Ambrose, P. M.). Natural resources, *in* [Symposium on] Resources for the chemical industry in the United States—Mid Atlantic: Indus. Eng. Chem., v. 45. p. 506-510, illus., 1953. An extremely cursory review of the mineral products of the Commonwealth is given. No new data are presented.

GREENWOOD, RICHARD

1. Anorthosite gabbros and related rocks of an area southwest of Wayne [Delaware Co.], Pennsylvania. M. A. thesis, Bryn Mawr Coll., 1959.

GREGORY, JOSEPH TRACY

1. Significance of fossil vertebrates for correlation of Late Triassic continental deposits of North America, *in* El Mesozoico del Hemisferio Occidental y sus correlaciones mundiales: Internatl. Geol. Cong. 20th, México 1956, [Trabajos], sec. 2, p. 7-25, illus., Mexico City, 1957. The Newark Group of the eastern United States and the Commonwealth is compared paleontologically with Upper Triassic rocks from other places. The Triassic rocks of Pennsylvania are correlated with the Middle and Upper Keuper Series of Germany, the type area.

GREGORY, WILLIAM KING

1. Biographical memoir of Henry Fairfield Osborn, 1857-1935: Natl. Acad. Sci. Biog. Mem., v. 19, p. 53-119, port., 1938.
2. William Letchworth Bryant (1871-1947): Am. Phil. Soc. Yearbook 1947, p. 238-240, 1948.

GREIG, JOSEPH WILSON, *see also* Wycoff, R. W. G., 1.

1. Formation of mullite from cyanite, andalusite, and sillimanite [from Delaware Co.]: Am. Ceramic Soc. Jour., v. 8, p. 465-483, illus., 1925; discussions by I. W. Ross, W. J. McCaughey, and the author, p. 483-484; Am. Jour. Sci. 5th ser., v. 11, p. 1-26, illus., 1926. Sillimanite from Delaware Co. is used along with other materials from other places in showing the origin of the mullite.

GREINER, HUGO

1. *"Spirifer disjunctus"*—its evolution and paleoecology in the Catskill delta: Yale Univ. Peabody Mus. Bull. 11, 75 p., illus., 1957. A monograph of what heretofore had been considered one very variable species reveals that numerous closely related species are actually present. Many are from the Upper Devonian formations of northwestern Pennsylvania. Paleoecological factors are discussed, as are stratigraphic details.

GRESLEY, W. S.

1. Note on some boulders, etc., found in the coal measures of the anthracite region of North America, [Part 4] *of* North American geological notes: Manchester Geol. Soc. Trans., v. 21, p. 71-74. 1890. Boulders [concretions] from the [Pennsylvanian] anthracite coal-bearing rocks are described. They are from Northumberland, Schuylkill, Lackawanna, and Wyoming Cos. Others are reported but not described. Some coarse conglomerate is also described.
2. Seven fossil tree trunks, probably *in situ,* found in the roof of a 12-foot seam of anthracite in Schuylkill Co., Pennsylvania, U. S. A., [Part 3] *of* North American geological notes: Manchester Geol. Soc. Trans., v. 21, p. 70-71, 1890. Sandstone casts of trees over 10 feet tall and 10-20 inches in diameter are described.
3. Side-light upon coal formation: Am. Geologist, v. 23, p. 69-80, illus., 1899. A resumé of features of coal beds is given to call attention to the sedimentary, *in situ* origin of the coal. Some of the features are resins, rod-like bodies, clay layers, shells, vegetable alteration, and areal extent.

GRIESS, PHYLLIS R., *see* Deasy. G. F., 1, 2, 3.

GRIFFITHS, JOHN CEDRIC, *see also* Emery, J. R., 1; Hutta, J. J., 1; Rosenfeld, M. A., 2.

1. Directional permeability and dimensional orientation in Bradford Sand: Pa. State Coll. Mineral Industries Exper. Sta. Bull. 54, p. 138-163, illus., 1949; Producers Monthly, v. 14, no. 8, p. 26-32, illus., 1950. A series of samples from the Commonwealth is used to demonstrate a principle. Rigorous statistical techniques are used. Different orientations are noted.
2. Petrographical evaluation of porosity measurement: Pa. State Coll. Mineral Industries Exper. Sta. Bull. 52, p. 6-30, 1949; Producers Monthly, v. 13, no. 6, p. 38-46, 1949. Several different sandstones from different places in the Commonwealth are used in the description of a statistical method to evaluate porosity.
3. (and Rosenfeld, M. A.). Progress in measurement of grain orientation in Bradford Sand: Pa. State Coll. Mineral Industries Exper. Sta. Bull. 56, p. 202-236, illus., 1951; Producers Monthly, v. 15, no. 8, p. 24-36, illus., 1951. Rigorous statistical evaluations of samples of the Bradford Sandstone show that grain orientation varies within the same rock sample.
4. Petrographic aspects of the finer-grained rocks of Pennsylvania: Mineral Industries, v. 21, no. 4, p. 1, 3-4, illus. incl. port., 1952. The clay content of different types of sandstones is described. The Commonwealth can be divided into geographic regions based upon the clays. In the west and north portions, underlain by Devonian-Pennsylvanian graywacke, illitic and kaolinitic clays predominate. The Cambrian-Silurian terrain is characterized by kaolinitic clays. Illite is common in the Triassic areas, and the metamorphic rock regions are largely clayless. Special clay types occur locally.
5. (and Rosenfeld, M. A.). A further test of dimensional orientation of quartz grains in Bradford Sand [northern Pa.]: Am. Jour. Sci., v. 251, p. 192-214, illus., 1953; discussion by Z. V. Jizba and reply by authors, v. 251, p. 899-906, illus., 1953; discussion with title, Effect of change of origin on mean and variance of two-dimensional fabrics, by F. Chayes, v. 252, p. 567-570, illus., 1954; reprinted *as* Pa. State Coll. Mineral Industries Exper. Sta. Tech. Rept. 194 [1953?]. A sample of Bradford Sand is used in a statistical experiment involving grain orientation, thin section orientation, and permeability.
6. A review of dimensional orientation of quartz grains in sediments: Pa. State Coll. Mineral Industries Exper. Sta. Bull. 60, p. 47-55, tables [1952]; Producers Monthly, v. 17. no. 3, p. 14-20 incl. ads., tables, 1953. Preferred orientation of quartz grains occurs in most samples from cores from reservoir rocks. The highest degree of orientation is in sections cut parallel to the greatest perme-

ability. Many examples are taken from the Commonwealth, notably the Bradford, Venango, Peru, Berea, and Homewood Sandstones.

7. Petrologic research on petroleum reservoirs in Pennsylvania: Producers Monthly, v. 17, no. 6, p. 48-50 incl. ads., 1953. Two phases of problems exist, (1) the search for new reservoirs, and (2) an attempt to get more oil from those already in production. Using the premise that the reservoir rock is the *only* primary factor, the ability to detect tiny differences in sedimentary rocks becomes extremely important. This philosophy is described with examples.
8. (and Bates, T. F., and Shadle, H. W.). Guide to field trip of Fourth National Clay Conference—clay minerals in sedimentary rocks, *in* Swineford, A., ed., Clays and clay minerals: Natl. Research Council Pub. 456, p. 1-20, illus., 1956. A field trip from State College to Oak Hall, Centre Co., to Skytop, Monroe Co., to Port Matilda, Centre Co., to Oremenia, Blair Co., and to Alexandria, Huntingdon Co., is outlined. The nature and origin of the clay deposits at each locality is briefly described. Electron- and photo-micrographs are included along with illustrations of x-ray diffraction patterns.
9. Sampling pebbles of "quartzite" from gravel at Montoursville [Lycoming Co.], Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1612, table, 1959.
10. Size and shape of rock-fragments in Tuscarora scree, Fishing Creek, Lamar [Clinton Co.], central Pennsylvania: Jour. Sed. Petrology, v. 29, p. 391-401, illus., 1959. Variation in size, size-sorting, and axial proportions of scree fragments is similar to the same variations in pebbles and quartz grains from other types of sedimentary deposits. No pattern of variation is evident over the small area sampled.

GRIGGS, ROY LEE

1. The Silurian salt deposits of the northeastern United States: U. S. Geol. Survey Trace Elem. Inv. 710, 1958. [not seen]

GRISCOM, ANDREW

1. Martic line in [southeastern] Pennsylvania—an aeromagnetic interpretation [abs.]: Geol. Soc. America Bull., v. 70, p. 1612-1613, 1959.

GROSS, CHARLES M.

1. The fauna of the Reedsville Shale at Ante's Gap [Lycoming Co.], Pennsylvania. M. S. thesis, Pa. State Univ., 1955.

GROSS, GERARDO WOLFGANG, *see also* Nichelsen, R. P., 4.

1. Geoelectrical investigations in the lower Paleozoic of central Pennsylvania. Ph.D. thesis, Pa. State Univ., 1959; [abs.] Dissert. Abs., v. 20, p. 1741-1742, 1959.
2. (and Moore, E. J.). Spontaneous polarization potentials and clay and limonite deposits in the Gatesburg Formation of Central Pennsylvania: Econ. Geology, v. 54, p. 1056-1067, illus., 1959. Broad belts of self-potential minima are detected. They are related to sandy residual soil over the Gatesburg Formation. An explanatory hypothesis is proposed; the method may be useful in prospecting for clay deposits.

GUETTARD, JEAN, 1715-1786.

1. Carte minéralogique, ou l'on voit de nature des terreins du Canada et de la Louisiane. 1 inch = 310 miles, *from* Hist. de l'Acad. Roy des Sciences Ann. 1752, pl. 8, p. 220, *in* Mémoire dans lequel on compare le Canada a la Suisse, par rapport a ses mineraux. Paris, 1756. [not seen]

GULLEY, M. GORDEN

1. Willem A[nton] J[osef] M[aria] van Waterschoot van der Gracht (1873-1943): Am. Assoc. Petroleum Geologists Bull., v. 28, p. 1066-1070, port., 1944.

HAAS, JOHN

1. [Dave's Cave, Mifflin Co.]: Nittany Grotto Newsletter, v. 7, p. 30 (‡), illus., 1958. A cave in Ordovician limestone is described. A sketch map is included.
2. (and Hoover, H.). Depth measurements in springs in Nippenose Valley [Lycoming Co.]: Nittany Grotto Newsletter, v. 7, p. 9-10 (‡), illus., 1958. Plumbline measurements in large springs and one lake in a cave are made. The Main Spring is 23 feet deep, the Small Spring is 49 feet deep, and the Triplet Sinks have one point 34 feet deep. The Deep Sink is 27 feet deep and the Eiswert Cave Sink is 82 feet deep. Sketch maps are included.

3. New caves and extensions (central Pennsylvania): Speleo Digest 1958, pt. 1, p. 1-1 - 1-67 (‡), illus., 1959; reprinted and enlarged *from* Nittany Grotto Newsletter, v. 6, no. 5, 1958. Many caves are described; sketch maps are included for many.

HAIT, MORTIMER H., JR., *see* Beerbower, J. R., 2.

HALBERSTADT, BAIRD, 1860-1934.

1. General map of the bituminous coal fields of Pennsylvania, revised to 1909. Scale 1 inch to about 20 miles, Pottsville, 1910; accompanied by a directory, [39 p.], Pottsville, 1909-1910.

HALEY, BOYD RAYMOND, *see also* Rothrock, H. E., 2, 3, 4, 5.

1. (and others). Geology of anthracite in the western part of the Ashland Quadrangle [Columbia, Schuylkill Cos.], Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 13 (2 sheets). Scale 1:12,000 (1 inch to 1000 feet), with sections and text, 1953. This contains a coal outcrop map, a structure contour map of the Buck Mountain and Mammoth coal beds, some cross sections, and a brief text.
2. (and others). Geology of anthracite in the eastern part of the Ashland Quadrangle [Columbia, Schuylkill Cos.]. Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 14 (2 sheets). Scale 1:12,000 (1 inch to 1000 feet), with sections and text, 1954. Cross sections, a coal outcrop map, and a structure contour map of the Buck Mountain and Mammoth coal beds precede a short geologic description of the region.

HALL, CHARLES EDWARD

1. (and Genth, F. A.). The geology of Philadelphia County and the southern parts of Montgomery and Bucks: Pa. Geol. Survey 2d, C 6, xx, 145 p., illus. incl. geol. map, 1881; discussion with title, Notes on the geology of Lower Merion and vicinity by T. D. Rand: Acad. Nat. Sci. Philadelphia Proc. [v. 34] 1882, p. 61-67, illus., 1883; Mining and Geology Sec. Proc. no. 2, p. 28-34, illus., 1882; discussion with title, The geological position of the Philadelphia gneisses, by C. H. Hitchcock: Am. Inst. Mining Engineers Trans., v. 12, p. 68-71, 1884; discussion by T. D. Rand and P. Frazer, Jr., p. 72-73; discussion with title, The horizon of the South Valley Hills in Pennsylvania, by P. Frazer, Jr.: Am. Phil. Soc. Proc., v. 20, p. 510-518, 1882. A complete geologic description of the area is given. [Precambrian]-Ordovician, Triassic, and Tertiary rocks are present. Special emphasis is on the [Precambrian] rocks. Sections are measured; analyses are made. No economic products are considered. Hitchcock discusses the ages of the serpentines; Frazer considers the schists to be [Precambrian].

HALL, COURTNEY ROBERT

1. A scientist in the early Republic, Samuel Latham Mitchill, 1764-1831. vi, 162 p., port., New York, Columbia Univ. Press, 1934.

HALL, EUGENE RAYMOND

1. Mustelid mammals from the Pleistocene of North America, with systemic notes on some recent members of the genera *Mustela, Taxidea,* and *Mephitis, in* Studies of Tertiary and Quarternary mammals of North America: Carnegie Inst. Washington Pub. 473, p. 41-119, illus., 1936. Four genera from Port Kennedy Cave in Montgomery Co. are described and illustrated. Also, two are from the Frankstown Cave in Blair Co. All are Pleistocene in age.

HALL, GEORGE MARTIN, 1891-1941.

1. Description of fire clay localities: Md. Geol. Survey, v. 11, p. 349-375, illus., 1922. Sections are measured in Somerset Co.

HALL, JAMES, 1811-1898, *see also* Bear Valley Coal Company, 1.

1. [Geological] Report, *in* [Townsend, Elihu] Reports on the Bear Mountain Railroad . . . , p. 37-44, illus., New York, J. W. Bell, 1845. A report of the anthracite occurrences and iron ore in the Bear Valley Coal Basin, in Dauphin and Schuylkill Cos., is given as part of a prospectus.
2. Descriptions of organic remains of the lower division of the New York System. Paleontology of New York, v. 1, 338 p., illus., Albany, C. von Benthuysen, 1847. Included in a great list of descriptions are pelecypods, gastropods, nautiloids, and trilobites from the Trenton Limestone in Cumberland Co., near Carlisle. All are described and illustrated.

3. A chart giving an ideal section of the successive formations, with an actual geological section from the Atlantic to the Pacific Ocean, the whole illustrated by the characteristic fossils of each formation. 58 x 71 inches, Albany, [1852]; key, 72 p., Boston, Gould and Lincoln, 1852. A diagrammatic, hypothetical cross section, designed as a public-school teaching aid, contains references to the Commonwealth, i.e., those places where each formation crops out. His classification is a mixture of the old and the modern.
4. Report [of the mineral lands] *in* Charter and Bylaws of the LaFayette Mineral Company [McKean Co.] . . . , p. 11-29, illus., New York, S. W. Benedict, 1853. This is a report designed to accompany a prospectus. Only bituminous coal is discussed.
5. Preliminary notice of the trilobites and other Crustacea of the Upper Helderberg, Hamilton, and Chemung Groups: N. Y. State Mus. Regents Rept., v. 15, p. 82-114, 1861; N. Y. State Cab. Ann. Rept. 15, p. 82-113, 1862. *Proeteus haldemani,* from Devonian rocks somewhere in Pennsylvania, is described
6. Descriptions of new species of Brachiopoda from the Upper Helderberg, Hamilton, and Chemung Groups: N. Y. State Cab. Ann. Rept. 16. p. 19-37, 1863. *Discina elmira* from Devonian rocks in Tioga Co. is described.
7. Descriptions and figures of the fossil Brachiopoda of the Upper Helderberg, Hamilton, Portage, and Chemung Groups: N. Y. Geol. Survey, Paleontology, v. 4, 428 p., illus., 1867. *Discina elmira* and *Stenocisma contracta* from Tioga Co.; *Stenocisma stephani* from Bedford Co.; and *Chonetes setigera, C. muricatus, Productella hirsuta rectispina, P. bialveata, Spirifera alta, S. praematura, Athyris angelica,* and *Stenocisma contracta* from Crawford Co., are described and illustrated along with many others.
8. Note on the genus *Palaeaster,* with descriptions of some new species, and observations upon those previously described: N. Y. State Cab. Ann. Rept. 20, p. 282-303, illus., 1867; revised ed., Note XII, p. 324-345, illus., 1868 [1870]. *Lepidechinus rarispinus,* from the Chemung Formation in Crawford Co., is described and illustrated.
9. Preliminary notice of the lamellibranchiate shells of the Upper Helderberg, Hamilton, and Chemung Groups . . . Part 2. 97 p., Albany, Weed, Parsons and Co. 1870. *Macrodon chemungensis* and *Grammysia hannibalensis* from Crawford Co. are described.
10. Descriptions of new species of Goniatitidae . . . : N. Y. State Mus. Ann. Rept. 27, p. 132-136, 1875. *Goniatites chemungensis equicostatus* from Chemung rocks in Bradford Co. is described.
11. The Niagara and Lower Helderberg Groups . . . : N. Y. State Mus. Ann. Rept. 27, p. 117-131, illus. geol. map, 1875. This is a regional review, including the Commonwealth, of the Silurian-Devonian contact-formations. Few details are included. A generalized map is included. He is answering a discussion by Meek, 1873.
12. Gasteropoda, Pteropoda, and Cephalopoda: N. Y. Geol. Survey, Paleontology, v. 5, pt. 2, xv, 492 p., illus. [vol. of plates], 1879. A Devonian gastropod from Crawford Co., a Devonian pteropod from Huntingdon Co., and nautiloids from Warren Co. are described and illustrated. They are Devonian.
13. Classification of the Lamellibranchiata: N. Y. State Geologist Ann. Rept. 1, p. 8-15, illus., 1884. Devonian pelecypods from Tioga, Susquehanna, Warren, McKean, Bradford, and Crawford Cos. are illustrated only.
14. Descriptions of species of fossil reticulate sponges, constituting the Family Dictyospongidae [abs.]: N. Y. State Mus. Ann. Rept. 35, p. 465-481, illus., 1884. Devonian sponges from Erie and Warren Cos. and Mississippian sponges from Warren and Venango Cos. are described and illustrated.
15. Monomyaria, [Part] 1 *of* Lamellibranchiata: N. Y. Geol. Survey, Paleontology, vol. 5, pt. 1, p. xviii, 1-268, illus., 1884. Pectenoid pelecypods from Devonian rocks in Tioga, Warren, Crawford, Susquehanna, and McKean Cos. are described and illustrated.
16. Preliminary notice of the lamellibranchiate shells of the Upper Helderberg, Hamilton, and Chemung groups, part 1, Monomyaria: N. Y. State Mus. Ann. Rept. 35, p. 215-406g, 1884; also published as separate with illustrations, 1884. Devonian clams are described from Tioga, Warren, Bradford, Crawford, Susquehanna, and McKean Cos.

17. Dimyaria, [Part] II *of* Lamellibranchiata: N. Y. Geol. Survey, Paleontology, v. 5, pt. 1, lxii, p. 269-561, illus., 1885. Many genera and species of pelecypods from the Upper Helderberg, Hamilton, Portage, and Chemung Formations are described and illustrated. Besides New York, they are reported from Crawford, Bradford, Susquehanna, Tioga, Warren, McKean, Sullivan, and Fayette Cos.
18. [Illustrations of fossils described in Paleontology of New York, v. 6, pt. 2]: N. Y. State Geologist Ann. Rept. 5, plates 30-117, 1886. *Orthoceras expositum* from Devonian rocks in Bradford Co. and *Gyroceras stebas* from Mississippian rocks in Warren Co. are illustrated.
19. . . . Pteropoda, Cephalopoda, and Annelida: N. Y. Geol. Survey, Paleontology, v. 5, pt. 2, suppl., 42 p., illus., 1888. [included with v. 7, 1888] *Orthoceras expositum* from Devonian rocks of Bradford Co. and *Gyroceras? stebas* from Mississippian rocks of Warren Co. are described and illustrated.
20. (and Clarke, J. M.). Trilobites and other Crustacea of the Oriskany, Upper Helderberg, Hamilton, Portage, Chemung, and Catskill Groups: N. Y. Geol. Survey, Paleontology, v. 7, 236 p., illus., 1888. Xiphosurans, eurypterids, and other crustaceans are described and illustrated. Some are from Devonian rocks in Erie and Warren Cos.
21. (and Clarke, J. M.). An introduction to the study of the genera of the Brachiopoda: N. Y. Geol. Survey, Paleontology, v. 8, pt. 1, 367 p., illus., 1892; pt. 2, 394 p., illus., 1894. Genera are discussed. The following species are illustrated only and are used as examples: Warren Co. Devonian, *Orbiculoidea* sp.; Warren Co. Mississippian, *Orbiculoidea* cf. *O. pulchra, Chonopectus fischeri,* and *Syringothyris randalli;* Tioga Co. Devonian, *Orthis impressa* and *Stropheodonta (Douvillina) cayuta;* Crawford Co. Devonian, *Productella hirsuta, P. muricata, Cyrtia alta, Spirifer praematuris* and *Camarotoechia orbicularis;* McKean Co. Mississippian, *Rhyncospira scansa;* Bradford Co. Devonian, *Camarotoechia stevensi;* Perry Co. Devonian, *Newberria claypolii;* northern Pa. Devonian, *Liorhynchus lesleyi* and Mississippian, *Rhyncospira* sp.
22. (and Clarke, J. M.). The new species of Brachiopoda described in Paleontology of New York, v. VIII, parts 1 and 2, 1892-1894: N. Y. State Geologist Ann. Rept. 14, p. 323-402, illus., 1895 [1897]; N. Y. State Mus. Ann. Rept. 48, v. 2, p. 323-402, illus., 1895 [1897]. *Rhyncospira scansa* from Mississippian rocks of McKean Co. and *Liorhynchus lesleyi* from Devonian rocks of [northern] Pennsylvania are described and illustrated.
23. (and Clarke, J. M.). A memoir on the Paleozoic reticulate sponges constituting the family Dictyospongidae: N. Y. State Geologist Ann. Rept. 15, v. 2, p. 741-984, illus., 1898; . . . 16, p. 341-448, illus., 1899; N. Y. State Mus. Ann. Rept. 49, v. 3, p. 741-984, illus., 1898; . . . 50, v. 2, p. 341-448, illus., 1899; N. Y. State Mus. Mem. 2, 350 p., illus., 1898. Many sponges from the Commonwealth are included. They occur in Devonian rocks of Erie, Warren, Tioga, and Susquehanna Cos., and from Mississippian rocks in Warren and Venango Cos. All are described and illustrated.

HALL, ROBERT BURNETT

1. William Herbert Hobbs, 1864-1953: Assoc. Am. Geographers Annals, v. 43, p. 284-288, port., 1953.

HALLER, C. P.. *see* Aresco, S. J., 1, 2, 3, 4, 5, 6, 7, 8.

HAMBLETON, HARVEY J., *see* Swartz, F. M., 12.

HAMILTON, CHARLES L., *see* Gault, H. R., 3.

HAMILTON, HOWARD V., *see also* Seaman, D. M., 1.

1. Notes on the occurrence of celestite in [Blair Co.] Penna.: Rocks and Minerals, v. 25, p. 348-350, illus., 1950. Celestite localities and crystals are described. Its occurrence in the Silurian strata is discussed.
2. The Brush Creek horizon, Pt. 1 *of* Fossil collecting in western Pennsylvania: Rocks and Minerals, v. 30, p. 385-386, illus., 1955. The fossil suite and collecting locations are described for the popular reader.
3. Fossil seed pods in Pennsylvania: Rocks and Minerals, v. 31, p. 154-155. 1956. *Trigonocarpus carbonarium* specimens from Pennsylvanian rocks in Beaver, Armstrong, and Elk Cos., are described.

4. The Cambridge (Pine Creek) Limestone, Pt. 2 *of* Fossil collecting in western Pennsylvania: Rocks and Minerals, v. 31, p. 44, 1956. The fossil suite and some localities are described for the popular reader.

HAMILTON, S. HARBERT

1. Exploration of the Delaware [River] Valley: Mineral Collector, v. 6, p. 117-122, 1899. This is a popular account of the geology and mineralogy along a route from Philadelphia northward, past Easton, to Trenton, N. J.

HAMLIN, AUGUSTUS CHOATE

1. The gems of the United States: Am. Assoc. Adv. Sci. Proc., v. 18, p. 210-216, 1870. Many different types of gems from the southeastern counties are cursorily mentioned. No new data are included.

HAMMER, SIGMUND

1. Investigation of the vertical gradient of gravity: Am. Geophys. Union Trans., v. 19, p. 72-82, illus., 1938. A discussion of a technique includes a small-scale gravity-anomaly map of Pennsylvania and vicinity.

HANDLIRSCH, ANTON, 1864-1935.

1. Revision of American Paleozoic insects: U. S. Natl. Mus. Proc., v. 29, p. 661-820, illus., 1906. A complete review of the group includes many from the Commonwealth. Most are illustrated. All are Pennsylvanian; many are new.

HANEY, WARREN D.

1. Petrology of the Chemung Formation above the Bradford Third Sand from core of the Summit Well [Fayette Co.]. M. S. thesis, Pa. State Coll., 1952.

HARDING, RICHARD W.

1. Correlation of Bradford Third and Richburg Sand [Tioga Co.], Pennsylvania and New York: Am. Assoc. Petroleum Geologists Bull., v. 34, p. 1866-1873, illus., 1950. Stratigraphic studies of well logs and electric logs show that the Devonian Bradford Third Sand can be correlated with the lens or lenses known as the Richburg Sand in New York.

HARLAN, RICHARD, 1796-1843, *see also* Featherstonhaugh, G. W., 1.

1. Observations on fossil elephant teeth of North America [western Pa.]: Acad. Nat. Sci. Philadelphia Jour., v. 3, p. 65-67, illus., 1823. Elephantine teeth from many localities, including western Pennsylvania, are mentioned. Two distinct but unnamed species are recognized.
2. Critical notices of various organic remains hitherto discovered in North America, *in* his Medical and physical researches . . . , p. 253-313, illus., Philadelphia, Lydia Bailey, 1835. *Rhinoceroides alleghaniensis* a jaw fragment from Somerset Co. is discussed; *Eurypterus lacustris,* from [Devonian] rocks in [Erie Co.] is described and illustrated. *Fucoides brongniarti,* from [Silurian?] rocks in the "Mountain ranges of western Pennsylvania" . . . is discussed and illustrated; *F. alleghaniensis* [from Silurian rocks in Mifflin Co.?] is also described.
3. Description of a new fossil plant from [Schuylkill Co.?] Pennsylvania, of the genus *Equisetum, in* his Medical and physical researches, p. 390-392, illus., Philadelphia, Lydia Bailey, 1835. *Equisetum stellifolium* is described and illustrated. It is from black shale in [Pennsylvanian] rocks.
4. Description of an extinct species of fossil vegetable, of the Family Fucoides, *in* his Medical and physical researches, p. 393-397, illus., Philadelphia, Lydia Bailey, 1835. *Fucoides alleganiensis,* from Silurian rocks in Mifflin Co., is described and illustrated.
5. Description of fossil vegetable remains from the bituminous coal measures of Pennsylvania. *in* his Medical and physical researches, p. 386-389, illus., Philadelphia, Lydia Bailey, 1835. *Pecopteris obsoleta* and *P. milleri* from Indiana Co. in [Pennsylvanian] rocks are described and illustrated. Other specimens of *Neuropteris* from several other places in the Commonwealth are discussed.

HARR, LUTHER

1. (and Rice, W. E., and Moran, H. E.). Typical analyses, bituminous coals produced in districts 2, 3, 4, 5, and 6 (. . . western Pennsylvania . . .). Data Book, v. 3, 29 p., illus., Washington, D. C., U. S. Bur. Mines and U. S. Office of Bituminous Coal Consumers Council, 1941. [not seen]

HARTMAN, FRANK

1. Centre County Caves: Nittany Grotto Newsletter, v. 7, no. 4, p. 51-54 (‡), 1958; Speleo Digest 1958, pt. 1, p. 1-82 - 1-83 (‡), illus., 1959. Several small caves are described. A sketch map of Woodward Cave no. 2 is included.
2. (and Landis, C.). Veiled Lady Cave . . . Centre Co.: Nittany Grotto Newsletter, v. 6, p. 26-27 (‡), illus., 1957; Speleo Digest 1957, pt. 1, p. 1-60 - 1-61 (‡), illus., 1958. This former commercial cave in Trenton Limestone is described; a sketch map is included.
3. More caves for Centre County: Nittany Grotto Newsletter, v. 7, p. 51-54 (‡), illus., 1958; (and Smeltzer, B.), p. 107 (‡), 1959. Six caves are described; Woodward Cave no. 2 and Pine Creek Spring House Cave are mapped.

HASS, WILBERT HENRY, 1906-1959.

1. Upper Devonian conodonts of New York, [northwestern] Pennsylvania, and interior states: Jour. Paleontology, v. 32, p. 765-769, 1958. Lists of conodonts found in the various rock units of the Cassadaga Stage are given.
2. Conodont faunas from the Devonian of New York and [northwestern] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1615, 1959.

HASSEMER, JERRY, *see also* Ifft, J., 1.

1. Diamond I Cave . . . Mifflin Co.: Nittany Grotto Newsletter, v. 6, p. 43-44 (‡), illus., 1957; Speleo Digest 1957, pt. 1, p. 1-66 - 1-67 (‡), illus., 1958. Diamond I Cave is in Trenton Limestone. It is relatively small; a sketch map is included.
2. Hennigh Cave . . . Centre County, Pa.: Nittany Grotto Newsletter, v. 6, no. 5, 1958; Speleo Digest 1958, pt. 1, p. 1-6 [p. 6] (‡), illus., 1959. A cave in Trenton Limestone is described and mapped.
3. Graysville Cave, Huntingdon County: Nittany Grotto Newsletter, v. 7, p. 187-188 (‡), illus., 1959. A description of the cave in Cambrian limestone includes a sketch map.

HAWKES, HERBERT EDWIN, JR.

1. Magnetic anomaly near Bechtelsville [Berks Co.], Pa.: U. S. Geol. Survey Prelim. Rept., 2 p. (‡), illus., 1945. [not seen]
2. (and Wedow, H., Jr., and Balsley, J. R., Jr.). Geologic investigation of the Boyertown magnetite deposits in [Berks Co.], Pennsylvania: U. S. Geol. Survey Bull. 995-D, p. iii, 135-149, illus., 1953. Magnetite occurs as a diabase-associated replacement of Paleozoic and Triassic carbonate rocks. The ore body is studied by a magnetite survey and by diamond drilling. Magnetic maps are included.

HAY, OLIVER PERRY, 1846-1930.

1. Descriptions of some vertebrates of the Carboniferous age: Am. Phil. Soc. Proc., v. 39, p. 96-123, illus., 1900. A fish scale, *Strepsodus arenosus,* from Mississippian shale in Blair Co. is described and illustrated.
2. The geological and geographical distribution of some Pleistocene mammals: Science new ser., v. 30, p. 890-893, 1909. A survey discussion describes the mammals from the Pleistocene Epoch in eastern North America, including those of the Commonwealth. Horses and bears are included.

HAYDEN, HORACE EDWIN

1. Frederic Corss M. D. [1812-1908]: Wyoming Hist. and Geol Soc. Proc. and Coll., v. 12, p. 215-217, 1912.

HAYWOOD, J. K.

1. (and Smith, B. H.). Mineral waters of the United States: U. S. Dept. Agric. Bur. Chem. Bull. 91, 100 p., 1905. Water from springs in Bedford and Allegheny Cos. is analyzed. That from Bedford does not have the high lithium content which is advertised.

HEA, J. P., *see* Swartz, F. M., 6.

HEALD, KENNETH CONRAD, *see also* Fenneman, N. M., 3.

1. (and Ayres, E). Our reserves of coal and shale, *in* Fanning, L. M., ed., Our oil resources, p. 157-209, illus., 1945. The Commonwealth still has over 117 billion tons of coal and over 8000 barrels of shale oil in reserve.

HECK, EDWARD TIMMEL

1. Fractures and joints: Producers Monthly, v. 19, no. 4, p. 20, 22-23, illus., 1955. All consolidated rocks are jointed and they differ only in the degree

of jointing and whether or not some of the joints have been cemented. Numerous examples are taken from the Commonwealth.

HECK, NICHOLAS HUNTER, 1882-1953.

1. Earthquakes of the Appalachian Mountain region [abs.]: Geol. Soc. America Proc. 1934, p. 446-447, 1935.
2. Earthquake history of the United States, Part 1: U. S. Coast and Geod. Survey Ser. 609, 83 p., illus., 1938; revised, 1947. Earthquakes in Philadelphia, Lehigh, and Erie Cos. are listed in tabular form and discussed.
3. Continental United States and Alaska—exclusive of California and western Nevada, Part 1 *of* Earthquake history of the United States. 1956 ed., iii, 80 p., illus., revised by R. A. Eppley, Washington, D. C., U. S. Coast and Geod. Survey, 1958; originally published 1938. Six recorded earthquakes have occurred within the Commonwealth since 1638. None were strong nor destructive. All were local; a few from as far away as Canada have been felt, however.

HEEREN, LILLIAN, *see* Jones, T. H., 1; Lytle, W. S., 3.

HEILPRIN, ANGELO, 1853-1907.

1. [The phenomenon of glaciation]: Acad. Nat. Sci. Philadelphia Proc. 1883, p. 46-47, 69-70, 1883; discussion by H. C. Lewis, p. 47-49, 70-71, 1883. Examples of glacial phenomena to show that the ice flowed from the north (rather than that it occurred as a stagnant ice cap) are taken from the northeastern counties and elsewhere.

HENBEST, LLOYD GEORGE

1. John B[ernard] Reeside, Jr., 1889-1958: Cushman Found. Foram. Research Contrib., v. 10, pt. 2, preceding p. 25, 1959.

HENDERSON, EDWARD PORTER

1. Corrections to published analyses of meteorites: Am. Jour. Sci., v. 239, p. 407-411, 1941. The Mt. Joy meteorite from Adams Co. is reanalyzed. It is above the range of normal hexahedrites and close to the boundary between coarsest octahedrites and hexahedrites.
2. (and Perry, S. H.). Studies of seven siderites: U. S. Natl. Mus. Proc., v. 107, p. 339-403, illus., 1958. A 292 pound iron meteorite from near Pittsburgh, Allegheny Co., is completely described chemically and metallographically.

HENDERSON, JOHN RICHARD, *see* Bromery, R. W., 2, 5, 6.

HENDERSON, R. G., *see* Vacquier, V., 1.

HENDRICKSON, WALTER BROOKFIELD

1. David Dale Owen [1807-1860], man of science: Sci. Monthly, v. 56, p. 253-258, port., 1943.
2. David Dale Owen [1807-1860], pioneer geologist of the Middle West. 180 p., illus., Indianapolis, Ind., Ind. Historical Bur., 1943.

HENNEN, RAY VERNON, 1875-1958.

1. Marshall, Wetzel, and Tyler Counties. 654 p., illus. incl. geol. map, W. Va. Geol. Survey, 1907. Since these counties lie athwart the southwestern corner of the Commonwealth, much information about the Permian rocks in them comes from Greene Co., Pa.

HERBER, ELMER C.

1. Spencer F[ullerton] Baird [1823-1887]—nineteenth century naturalist: Pa. Acad. Sci. Proc., v. 29, p. 43-47, 1955.

HERSHEY, HOWARD GARLAND, *see* Cloos, E., 1.

HEWETT, DONNEL FOSTER

1. Charles Kenneth Leith, January 20, 1875-September 13, 1956: Natl. Acad. Sci. Biog. Mem., v. 33, p. 180-204, port., 1959.

HEYL, ALLEN VAN, JR., *see* Pearre, N. C., 2.

HIBBARD, CLAUDE WILLIAM

1. The status of the genera *Anaptogonia* and *Sycium* Cope: Jour. Mammalology, v. 28, p. 67, 1947. Terminology used by Cope in his various references to the fauna of the Port Kennedy Cave, in Montgomery Co., is reviewed. *Sycium cloacinum* (Cope) is a synonym of *Ondatra hiatidens* (Cope).
2. Notes on the microtine rodents from the Port Kennedy cave deposit [Montgomery Co.]: Acad. Nat. Sci. Philadelphia Proc., v. 107, p. 87-97, illus., 1955. Four genera and five species are redescribed and redefined.

HICKOK, WILLIAM ORVILLE, 4th

1. Erosion surfaces in south-central Pennsylvania; The iron ore deposits at Cornwall [Lebanon Co.], Pennsylvania. Ph.D. thesis, Yale Univ., 1932.

HIETANEN, ANNA MARTTA

1. Chloritoid from Rawlinsville, Lancaster County, Pennsylvania: Am. Mineralogist, v. 36, p. 859-868, illus., 1951. Chloritoid occurs in a mica schist. Universal-stage measurements are given, as well as are refraction indices. The chemical formula is calculated as $(Fe'', Mn, Mg)_{1.9}(Fe''', Al)_{2.2}(Al_{1.9}Si_{2.1})O_{10.4}(OH)_{3.7}$.

HIGBEE, HOWARD WILLIAM, *see also* Millette, J. F. G., 1.

1. Birds nesting in soil banks disclose loess deposits in Susquehanna Valley: Pa. State Coll. Agriculture Exper. Sta. Bull. 529, supp. 2, p. 5-6, illus., 1951. This is a popular account of the occurrence of loess along the Susquehanna River valley. It is associated with the glacial outwash material.

HILLEBRAND, W. F., *see* Clarke, F. W., 8.

HILLS, JOHN M.

1. Stratigraphy and structure of the Lehigh Valley, Pennsylvania: Thesis, Univ. Chicago, 1934? [not verified]

HINSON, H. H., *see* Anderson, C. C., 1.

HINTON, JOHN HOWARD, 1791-1873.

1. (editor) The history and topography of the United States. . . . 2 vols., illus. incl. maps, London, Jennings and Chaplin, 1830-1832; 2d ed., Boston, S. Walker, 1845. [geology in vol. 2, p. 45-89; p. 40-84, 2d ed.]; also numerous other editions. A cursory description of the entire country includes references to the known geology and mineralogy of the Commonwealth. No new data are included.

HITCHCOCK, CHARLES HENRY, 1836-1919.

1. (and Hitchcock, E.). Geological map of the United States, compiled for R. P. Smith's Wall Map of the United States. Scale, 1 inch per 20 miles, New York, J. Bien, [1881]; text with similar title, 29 p., 1881.
2. Geological description [and geological map of the United States], *in* the National Atlas . . . , p. 181-184, map, O. W. Gray and Son, Philadelphia, 1876; also 1886 ed., p. 203-206.

HITCHCOCK, EDWARD, 1793-1864, *see also* Hitchcock, C. H., 1.

1. An attempt to discriminate and describe the animals that made the fossil footmarks of the United States and especially of New England: Am. Acad. Arts and Sci. Mem. new ser., v. 3, p. 129-256, illus., 1848. *Thenaropus heterodactylus* tracks, of an amphibian, from [Pennsylvanian] rocks in Westmoreland Co., are described and illustrated.
2. Outline of the geology of the globe, and of the United States in particular. . . . 136 p., illus. incl. geol map, Boston, Phillips, Sampson, and Co., 1853; 2d ed., Boston, 1854; 3d ed., Boston, 1856. A brief summary of the geology of the world, as known at that time, includes a small-scale geological map of the world and one of the United States, which includes the Commonwealth. No new data are included.

HOBBS, WILLIAM HERBERT, 1864-1953.

1. An explorer-scientist's pilgrimage, the autobiography of William Herbert Hobbs. 222 p., illus., Ann Arbor, Mich., J. W. Edwards, 1952.

HOBSON, JOHN PETER, JR.

1. Lower Ordovician (Beekmantown) succession in Berks County, Pennsylvania: Am. Assoc. Petroleum Geologists Bull., v. 41, p. 2710-2722, illus., 1957. The Beekmantown is raised to group rank and contains, from top to bottom: Ontelaunee Dolomite, Epler Formation, Rickenbach Dolomite, and Stonehenge Formation. The total thickness is over 2300 feet. Sections are measured.
2. The stratigraphy and structure of the Cambrian-Ordovician carbonate rocks of the Reading Quadrangle [Berks Co.], Pennsylvania. Ph.D. thesis, Pa. State Univ., 1958; with title, Stratigraphy of the northern belt of the Beekmantown Group in southeastern Pennsylvania [abs.]: Dissert. Abs., v. 19, p. 1343, 1958.
3. Stratigraphy and petrology of Lower Ordovician dolomites, southeastern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 69, p. 1583-1584, 1958.

HODGE, JAMES T.

1. [Geological] Report, *in* [Butterworth, J. F.] Report and statement of the directors of the Lycoming [Co.] Iron and Coal Company to the stockholders, p. 16-38, New York, W. H. Arthur and Co., 1853. A cursory review of the occurrence of coal, iron ore, fire clay, and stone is given. Some analyses of the iron ore and coal are included.

HOEFFER, HANS VON

1. Die Petroleum-Industrie Nordamerikas . . . : Oesterreichische Commission fuer die Weltaustellung in Philadelphia, 1876, no. 8. 166 p., Vienna, Faesyard Frick, 1877. A very general description of the occurrence of petroleum in Pennsylvania is included. No new data are included.

HOFFACKER, B. L., JR.

1. Resumé of the drilling and stratigraphy of the L. D. Wilson [well 18] deep test [McKean Co.]: Producers Monthly, v. 14, no. 10, p. 20-23, illus., 1950. Devonian-Ordovician rocks are encountered; the well-log is cursorily described. The depth is over 8000 feet. Porosity evaluation of the Silurian and Ordovician sands is made.

HOFFMAN, JOHN NATHAN

1. Manganese occurrences in central Pennsylvania: Compass, v. 32, p. 353-359, illus., 1955; reprinted *as* Pa. State Univ. Mineral Industries Exper. Sta. Circ. 45, 1955. Cursory descriptions of the occurrences in Bedford, Cumberland, Franklin, Blair, Centre, and Huntingdon Cos. are given. Few details are included.
2. Manganese, its minerals, deposits, and uses: Pa. State Univ. Mineral Industries Exper. Sta. Circ. 49, vi, 116 p., illus., 1957; revised 1958. A review of the manganese occurrences of the entire world includes a brief decription of some of those in the Commonwealth.

HOFFREN, VAINO, *see* Deevey, E. S., Jr., 1.

HOLLAND, FRANK DELNO, JR.

1. The Brachiopoda of the Oswayo and Knapp Formations of the Penn-York Embayment [northwestern Pa.] [abs.]: Dissert. Abs., v. 19, p. 1716, 1959; Geol. Soc. America Bull., v. 70, p. 1619, 1959.

HOLLAND, WILBUR C.

1. The ostracods of the Nineveh Limestone of Pennsylvania and West Virginia. M. S. thesis, Univ. Pittsburgh, 1933.

HOLLICK, CHARLES ARTHUR, 1857-1933.

1. Lester Frank Ward [1841-1913]: Science new ser., v. 38, p. 75-77, 1913.

HOLMES, JOSEPH A., *see* Parker, E. W., 1.

HOOVER, HENRY, *see* Haas, J., 2.

HOPKINS, THOMAS CRAMER, 1861-1935.

1. Fire clays: Mines and Minerals, v. 19, p. 53-55, illus., 1898. A general discussion of properties of fire clays is followed by some examples of their occurrence in the western coal fields of the Commonwealth. Few details are included.
2. Feldspar, its occurrence, mining, and uses: Mineral Industries, v. 7, p. 262-268, 1899. A general review of the industry and deposits includes those in southeastern Pennsylvania. No new data are included.
3. The fire clays and fire clay industry at Bolivar [Indiana, Westmoreland Cos.], Pa.: Clayworker, v. 31, p. 423-426, 517-520, illus., 1899. Both flint and plastic fire clay occur in several different beds. The clays occur between the Pottsville Formation and the Mahoning Sandstone. The most important clay bed is the one just below the Upper Freeport Coal, which is 20-25 feet thick. A section is measured, and an analysis is given.
4. Cambro-Silurian limonite ores of Pennsylvania. Ph.D. thesis, Univ. Chicago, 1900.

HOSKINS, DONALD MARTIN, *see also* Conlin, R. R., 1; Willard, B., 17.

1. (and Conlin, R. R.). Invertebrate fossils from the Bloomsburg Formation of central Pennsylvania: Pa. Acad. Sci. Proc., v. 32, p. 156-161, illus., 1958. Ostracodes from near Mifflintown, Juniata Co., and from near Selinsgrove, in Snyder Co., are listed. Marine transgressions are implied.

HOTCHKISS, JEDADIAH, 1839-1899.

1. Report on the mineral, timber, and farming lands belonging to the Karthaus Estate . . . Clearfield County, Pa. . . . . 29 p., illus., Baltimore, Sherwood and Co., 1873. This is a report designed to accompany a stock prospectus. Much extraction is taken from Rogers' report and from that of W. R. Johnson. The coal beds are described, as are the iron ore and limestone. Analyses are included. Fire clay is also present. Salt is discussed inasmuch as a well is being drilled nearby.

HOTZ, PRESTON ENSLOW

1. Diamond-drill exploration of the Dillsburg magnetite deposits, York County, Pennsylvania: U. S. Geol. Survey Bull. 969-A, p. 1-27, illus. incl. geol. maps, 1950. Magnetite has replaced parts of lenticular beds of Triassic limestone conglomerate. Mineralization occurred in conjunction with the emplacement of diabase. The extent of the ore bodies is discussed. Maps show the distribution of Triassic rocks and the ore-bodies.
2. Origin of granophyre in diabase in southeastern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 61, p. 1472, 1950.
3. Form of diabase sheets in southeastern Pennsylvania: Am. Jour. Sci., v. 250, p. 375-388, illus., 1952. Ringlike outcrop patterns are characteristic. Drill hole and geophysical data show that the diabase is in the form of generally discordant curved sheets. Pre-existing fractures or potential lines of weakness may have controlled the sheetlike form, or pressure may have forced the diabase magma to spread laterally.
4. Petrology of granophyre in diabase near Dillsburg [York Co.], Pennsylvania: Geol. Soc. America Bull., v. 64, p. 675-704. illus., 1953. A sequence of chilled zone, normal diabase, pegmatitic facies of diabase, granophyric diabase. and granophyre, is studied in detail. Crystal fractionation in a large sheetlike body of tholeiitic magma yields a small amount of granophyre.

HOUGH, JACK LUIN

1. Final report on the project Pleistocene chronology of the Great Lakes regions: O. N. R. Contract N6ori-07133, Proj. NR-018-122, vi, 108 p. (‡), illus., Urbana, Ill., Univ. Ill. Press, 1953. No data come from the Commonwealth, but maps of the glacial-lake boundaries include those in Commonwealth. Aside from the present Lake Erie shore, encroachments upon Erie Co. are shown during the times of Highest Lake Maumee, Middle Lake Maumee, Lake Arkona, Early Lake Warren, Lake Wayne, and Late Lake Warren.
2. Geology of the Great Lakes, xviii, 313 p., illus. incl. geol. maps, Urbana, Ill., Univ. Ill. Press, 1958. A detailed description of the lakes, sediments, preglacial, glacial and postglacial history, and dating includes the Commonwealth.

HOUGH, VAN NESS D., *see also* Nickelsen, R. P., 3.

1. Joint orientations of the Appalachian Plateau in southwestern Pennsylvania. M. S. thesis, Pa. State Univ., 1959.

HOWELL, BENJAMIN FRANKLIN, SR.

1. Memorial of Gilbert Van Ingen [1869-1925]: Geol. Soc. America Bull., v. 42, p. 159-163, port., 1931.
2. (and Roberts, H. B., and Willard, B.). Subdivision and dating of the Cambrian of [south]eastern Pennsylvania: Geol. Soc. America Bull., v. 61, p. 1355-1367, illus., 1950. A basal quartzite is overlain by dolomitic limestone. Algae is used to distinguish, within the carbonate rocks, the Upper Allentown (restricted), the Middle Limeport, and the Lower Limeport Formations.
3. Upper Cambrian fossils of Northampton County, Pennsylvania: Wagner Free Inst. Sci. Bull., v. 30, p. 45-60, illus., 1955. A suite of Dresbachian fossils from near Portland in the Allentown Formation consists of algae, inarticulate brachiopods, and trilobites. All are described and illustrated.
4. The base of the Cambrian in New England and the central Appalachians, *in* Rodgers, J., ed., El Sistema Cámbrico, su paleogeografía y el problema de su base—symposium, Pt. 2, p. 315-320, Mexico City, Internatl. Geol. Cong. 20th, 1956. The Lower Cambrian rocks of the entire area are described and discussed. Only very brief mention is made of those of the Commonwealth where the Cambrian System is very thin. Sandstones predominate. The contact with the underlying rocks is sharp and unconformable. Middle Cambrian beds are thin or absent.

5. Upper Cambrian fossils from Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. G 28, v, 39 p., illus., 1957. Trilobites, inarticulate brachiopods, and branchiopods from near Limeport are described and illustrated.

HOWELL, BENJAMIN FRANKLIN, JR.

1. (and Licastro, P. H., and Schwendinger, W. W.). An empirical correlation between rock resistivity and porosity for the Bradford Sand [McKean Co.]: Producers Monthly, v. 15, no. 11, p. 9-14, illus., 1951. A method is shown whereby porosity can be determined from the Bradford Third Sand after freshwater flooding. It requires two self-potential logs and one resistivity log. Some results are included.
2. (and Vozoff, K.). Gravity investigation in [Tioga Co.] north-central Pennsylvania: Am. Geophys. Union Trans., v. 34. p. 357-359, illus., 1953. "A gravity survey of about 900 square miles is described. Within this area a positive anomaly of 22 milligals is observed. It is shown that the greater part of this could be accounted for by the presence of a buried intrusion of diabase or peridotite."
3. Potentialities of gravity surveys in locating oil in Pennsylvania: Pa. State Coll. Mineral Industries Exper. Sta. Bull. 60, p. 93-98, illus., [1952]; Producers Monthly, v. 17, no. 5, p. 16-19 incl. ads., illus., 1953. A small map showing gravity variation in central Pennsylvania is discussed. A lack of density contrast in the rocks of central Pennsylvania indicates that gravity mapping is not very useful for locating shallow rock structures. Large-scale interpretations are possible, however.

HOWELL, JESSE VERE, *see also* Rogers, H. D., 9.

1. Historical development of the structural theory of accumulation of oil and gas, *in* W. E. Wrather and F. H. Lahee, eds., Problems of petroleum geology, p. 1-23, illus., Tulsa, Am. Assoc. Petroleum Geologists, 1934. An historical review includes much information from the Commonwealth. H. D. Rogers was the first who wrote about the possible anticlinal control of petroleum.

HOY, ROBERT BECK, *see also* Moebs, N. N., 1.

1. Geology of the Freidensville zinc mine [Lehigh Co.]: Mining Eng., v. 5, p. 1215, port., 1953. An extremely cursory description of the geology and ore occurrence is given.

HUBBARD, GEORGE DAVID

1. William Herbert Hobbs, 1864-1953: Science, v. 117, p. 521-522, 1953.

HUDDLE, JOHN WARFIELD, *see* Ferm, J. C., 3.

HUENE, FRIEDRICH VON

1. Ueber die Dinosaurier der aussereuropaeischer Trias: Geol. palaeontol. Abhandl. new ser., v. 8, no. 2, p. 1-60, illus., Jena, 1906. *Clepsysaurus pennsylvanicus,* from Triassic rocks in Lehigh Co., is shown not to be a dinosaur, but rather is a phytosaur.
2. (and Bock, W.). A small amphibian skull from the Upper Triassic of [Montgomery Co.] Pennsylvania: Wagner Free Inst. Sci. Bull., v. 29, p. 27-34, illus., 1954. *Lysorocephalus gwynnedensis,* from Triassic rocks near the Gwynned tunnel, is described and illustrated.

HUFFMAN, GEORGE GARRETT

1. Charles E[lijah] Decker (1868-1958): Compass, v. 36, p. 240-243, port., 1959.

HUGHES, GEORGE WURTZ, 1806-1870.

1. Report . . . on the Tioga [Co.] coal and iron mines. Albany, 1829. [not seen]

HULT, GOTTFRIED

1. Arthur Gray Leonard [1865-1932]—a tribute: No. Dak. Univ. Quart. Jour., v. 23, p. 157-159, 1933.

HUNT, THOMAS STERRY, 1826-1892.

1. On some points in American geology: Am. Jour. Sci. 2d ser., v. 31, p. 392-414, 1861. A review of the recent geological works includes much about the Appalachian Mountains in the Commonwealth. A description of the Precambrian-Lower Paleozoic rocks and their relationships to the mountains is given. Geologic history of the eastern United States, as the geosynclinal theory, is discussed. No new data are included.
2. Historical account of the Taconic question in geology . . . , Part 2: Roy. Soc. Canada Proc. and Trans., v. 2, sec. iv, p. 125-157, 1885. This is a con-

tinuation of the discussion started in Pa. Geol. Survey Bull. G-34, by Hunt, T. S., no. 11, p. 117.

3. Mineral physiology and physiography . . . . xvii, 710 p., Boston, S. E. Cassino, 1886; 2d ed., New York, Scientific Pub. Co., 1890. A detailed discussion of mineralogy, petrography, and metamorphism is followed by a discussion of the historical geology of the eastern United States from Precambrian through the Lower Paleozoic time. Evidence from the Commonwealth is used in the interpretation of the Taconic question. The Taconic rocks are missing in eastern Pennsylvania; Cambrian rocks rest unconformably upon Precambrian rocks.

HUSSEY, ARTHUR M., *see* DeVitt, W., 3d, 2.

HUTCHINS, THOMAS

1. A topographical description of . . . Pennsylvania . . . . 64 p., illus., London, J. Almon, 1778; Boston ed., 1787. A very early description of the physiography of western Pennsylvania along the Monongahela and Ohio Rivers is given. Very casual reference is made to geological features other than topography.

HUTTA, J. J.

1. (and Griffiths, J. C.). Directional permeability of sandstones—a test of technique: Pa. State Univ. Mineral Industries Exper. Sta. Bull. 64, p. 75-95, illus. [1954?]; Producers Monthly, v. 19, no. 11, p. 26-34. illus.; no. 12, p. 24-31, illus., 1955. Samples from the Commonwealth are used in the analysis-of-variance method of statistical evaluation. Samples of all bedded rock types, with few exceptions, show well-marked directional permeability trends, as did nine of the massive rock samples.
2. Fabric and permeability of some typical sediments: Pa. State Univ. Mineral Industries Exper. Sta. Bull. 68, p. 93-99, illus., [1955]. A method of obtaining the interrelationships between petrographic fabric and permeability is illustrated, using examples from the Commonwealth. Among those samples used are: Waynesburg [arkose] Sandstone, Bradford [low-rank graywacke] Sand, and Conemaugh, Pottsville, and Pocono [derived quartzite] Sandstones.

IDDINGS, JOSEPH PAXSON, 1857-1920.

1. George Huntington Williams [1856-1894]: Jour. Geology, v. 2, p. 759-767, port., 1894.
2. Memoir of Samuel Lewis Penfield [1856-1906]: Geol. Soc. America Bull., v. 18, p. 572-582, port., 1908.
3. Louis Valentine Pirsson [1860-1920]: Science, v. 51, p. 530-532, 1920.

IFFT, J.

1. (and Hassemer, J.). Petersburg Cave, Huntingdon Co.: Nittany Grotto Newsletter, v. 6, no. 5, p. 107 (‡), 1958; illus., v. 7, p. 31 (‡), 1958; text, Speleo Digest 1957, pt. 1, p. 1-51 ((‡), 1958; illus., Speleo Digest 1958, pt. 1, 1-85 (‡), 1959. Petersburg Cave, in Ordovician limestone, is described; a sketch map is included.

IMBRIE, JOHN, *see* Colbert, E. H., 1.

IMLAY, RALPH WILLARD

1. Memorial to John Bernard Reeside, Jr. (1889-1958): Geol. Soc. America Proc. 1958, p. 173-178, port., 1959.

INGHAM, ALBERT IRWIN, *see also* Ebright, J. R., 2, 3; Preston, F. W., 1.

1. [Map of] Geologic structures of the Northern Plateaus region of Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 138, scale 1 inch to 6 miles, revised, 1951; originally published 1934. The map shows structural features, locations of wells, Oriskany Sandstone boundaries and outcrops, and gas fields. Tabular well data are on the back.
2. The geology and development of Leidy-South Leidy gas fields, Clinton County, Penna.: Producers Monthly, v. 18, no. 10, p. 22-28 incl. ads., illus., 1954; revised and condensed, Pa. Dept. Internal Affairs Monthly Bull., v. 23, no. 1, p. 15-19, illus., 1954; no. 2, p. 27-30, 1955. The gas fields, occurring on a dome on the Wellsboro Anticline, are described. Production is from the Oriskany Sandstone and is structurally controlled. Pennsylvanian-Devonian rocks are briefly described. Sketch maps show the various features.
3. (and others). Oil and gas geology of the Sheffield Quadrangle [Forest, Warren Cos.] Pennsylvania: Pa. Geol. Survey 4th ser., Bull. M 38, v, 72 p., illus.,

1956. Surface and subsurface rocks from Devonian-Pennsylvanian age are described. Details of the petroleum-bearing rocks are included. Structures are described. The oil and gas are in Devonian rocks.

INGRAM, ROBERT J.

1. A sedimentary analysis of the Oriskany Sandstone, central Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1954.

ITTER, HARRY AUGUSTUS

1. The geomorphology of the Wyoming-Lackawanna Region [northeastern Pa.]. Ph.D. thesis, Columbia Univ., 1936.

JACKSON, CHARLES THOMAS, 1805-1880. *see also* Northwestern Pa. Oil and Gas Co., 1.

1. Geological report of lands belonging to the Ridgway Company, in Elk County, Pennsylvania. 19 p., Philadelphia, Parry and McMillan, 1856; in prospectus, p. 16-26, Philadelphia, Brown, Printer, 1856; in prospectus, p. 18-29, Philadelphia, Crissy and Markley, 1857. A report for a prospectus describes the coal, sandstone, iron ore, and limestone. Analyses of the coal, iron, and limestone are included.

JAFFE, HOWARD WILLIAM, *see also* Postel, A. W., 3.

1. (and others). Lead-alpha age determinations of accessory minerals of igneous rocks (1953-1957): U. S. Geol. Survey Bull. 1097-B, iii, 148 p., 1959. Tabular data are given for rock-age determinations, some of which are from the Commonwealth. Specimens from Northampton, Philadelphia, Delaware, Bucks, and Franklin Cos. are analyzed. The age in millions of years is shown.

JAMES, JOSEPH FRANCIS, 1857-1897, *see also* Lesquereux, L., 1.

1. A brief history of the Ohio River: Pop. Sci. Monthly, v. 38, p. 739-748, illus., 1891. This is a popular account of the effects of glaciation upon the Ohio River Valley. Lake Ohio was created by an ice barrier near Cincinnati which backed water up into Pennsylvania.

JANSON, GEORGE J.

1. The petrology and structure of the Gulf Mills-West Conshohocken area [Montgomery Co.]. M. A. thesis, Bryn Mawr Coll., 1952.

JARMELL, SOL

1. Gravity investigation in the Renovo area of [Clinton Co.] central Pennsylvania. M. S. thesis, Pa. State Univ., 1954; Pa. State Univ. Mineral Industries Exper. Sta. Bull. 68, p. 81-84, illus., [1955]; Producers Monthly, v. 20, no. 5, p. 36-40, illus., 1956. The Bouguer contours follow the geographical trend of the geologic structures. The residual anomaly map corresponds with the known local structures. A low at the Leidy Gas Field is interpreted as being caused by a salt dome.

JEFFRIES, CHARLES DAVID

1. The mineralogical composition of some Pennsylvania soils. Optical studies of feldspars. Ph.D. thesis, Univ. Wisconsin, 1936.

JENKS, WILLIAM FURNESS

1. John Lyon Rich (1884-1956): Am. Assoc. Petroleum Geologists Bull., v. 41, p. 167-169, port., 1957.

JENSEN, HOMER

1. Aeromagnetic survey helps find new Pennsylvania iron orebody: Eng. Min. Jour., v. 152, no. 8, p. 56-59, illus., 1951. The technique is described with an unknown location, but probably a southeastern county, used as an example.

JILLSON, WILLARD ROUSE

1. Geology of the oil shales of the eastern United States: Internatl. Geol. Cong. 14th, Spain 1926, C. R., v. 4, p. 2045-2052, Madrid, 1928. A review of occurrences of oil shale includes those from western Pennsylvania. No new data are included.
2. Stuart Weller [1871-1927]—a tribute: Ky. Geol. Survey ser. 6, v. 43, p. 115-119, 1931.

JIZBA, Z. V., *see* Griffiths, J. C., 5.

JOHNS HOPKINS UNIVERSITY

1. George Huntington Williams [1856-1894] . . . . 19 p., port., Baltimore, 1894.

JOHNSEN, JOHN HERBERT

1. The Schoharie Formation [northeastern Pa.]—a redefinition [abs.]: Dissert. Abs., v. 17, p. 2247, 1957; Geol. Soc. America Bull., v. 70, p. 1624-1625, 1959.

JOHNSON, DOUGLAS WILSON, 1878-1944.

1. (and Ver Steeg, K.). Appalachian studies II [abs.]: Geol. Soc. America Bull., v. 40, p. 132-133, 1929; Pan-Am. Geologist, v. 51, p. 154-155, 1929.
2. William Morris Davis [1850-1934]: Science, v. 79, p. 445-449, 1934.

JOHNSON, FREDERICK

1. Kirk Bryan, 1888-1950: Am. Antiquity, v. 16, p. 253, 1951.

JOHNSON, MEREDITH ESREY

1. Pittsburgh Quadrangle [Allegheny, Washington, Westmoreland Cos.]—geology and mineral resources: Pa. Geol. Survey 4th ser., Topog. Geol. Atlas 27, 236 p., illus., incl. geol. map, [1929]. A complete geologic description of the area is given. Pennsylvanian rocks are at the surface. The structure is a series of broad folds. Sections are measured. Coal, petroleum, and gas are the chief economic products. Clay, shale, limestone, sandstone, and sand and gravel are also present.
2. Henry Barnard Kummel, 1867-1945: Econ. Geology, v. 41, p. 99-100, 1946.
3. Memorial to Henry Barnard Kummel [1867-1945]: Geol. Soc. America Proc. 1945, p. 253-258, port., 1946.
4. (and Willard, B.). Delaware Valley Paleozoics [northeastern Pa.], *in* Geol. Soc. America Guidebook for field trips . . . , Field Trip no. 4, p. 125-131, illus., Atlantic City, 1957. The Cambrian-Devonian rocks are described cursorily. The faunas are listed. A road-log is included.
5. (and McLaughlin, D. B.). Triassic formations in the Delaware Valley [Bucks Co.], *in* Geol. Soc. America Guidebook for field trips . . . , Field Trip no. 2, p. 31-56, illus. incl. geol. map, Atlantic City, 1957. A detailed description of the Triassic rocks in Bucks Co., along the Delaware River, includes a composite measured section. A road log is included.

[JOHNSON, OVID]

1. (and others). Report to the legislature of Pennsylvania containing a description of the Bear Valley Coal Basin . . . Dauphin, Schuylkill [Cos.] . . . . 12 p., illus., Harrisburg, Pa., Packer, Barrett, and Parke, 1839. A brief description of the topography of the Lykens Valley and Bear Valley region is given, followed by an even briefer discussion of the coal beds.

JOHNSON, W. E.

1. (and Breston. J. N.). Directional permeability measurements on oil sandstones from various states: Producers Monthly, v. 15, no. 4, p. 10-19, 1951. Numerous samples come from oil-bearing sandstones of northern Pennsylvania. Measurements from core samples show that directional permeability, while not present in *all* cores in all fields, is consistent in the Bradford Field.

JOHNSON, WALTER ROGERS, 1794-1852, *see also* Bear Valley Coal Company, 1.

1. Report of an examination of the mines, iron works, and other properties belonging to the Clearfield Coke and Iron Company [Clearfield Co.] . . . . 22 p., illus., Philadelphia, Lydia R. Bailey, 1839. A report of the general state of the property and the operation of the mines includes descriptions of the coal beds, iron ore zones, and limestone. A section is measured near Karthaus.

JOHNSTON, JOHN KILGORE, 1880-.

1. Report on the bituminous coal beds of Pennsylvania in territory adjacent to the Pennsylvania Railroad east of Pittsburgh and Erie. 155 p., illus., Tyrone, Pa., Stephen Greene Co., 1911. A general survey of the geology of western Pennsylvania includes detailed dscriptions of the occurrences of coal beds and the Pennsylvanian-Permian stratigraphy. Numerous analyses are included, along with tonnage reserves calculated for various regions along the railroad.

JONAS, ANNA ISABEL, *see also* Stose, G. W., 1.

1. (and Stose, G. W.). New formation names used on a geologic map of Frederick County, Maryland: Wash. Acad. Sci. Jour., v. 28, p. 345-348, 1938. A preliminary report includes a description of the Marburg Schist, from York County. It is a blue and green, muscovite and chloritoid schist with infolded quartzite beds. It is a part of the Glenarm Series and overlies the Wissahickon Schist.

JONES, EDWARD

1. [Geological] Report, *in* [Potts, George H.] Northern Railway and Coal Company, [Luzerne Co.], p. 12-30, illus., New York, Baker and Godwin, 1865.

This is a report accompanying a prospectus. Coal beds are described. The Carbondale coal bed is an important producer in the area. Over 121 million tons of coal are estimated to be present in 8838 acres of land along the Lackawanna River north of Scranton.

2. [Geological] Report of Edward Jones, *in* Northern Railway and Coal Company [Luzerne Co.], p. 13-28, illus., New York, Baker and Godwin, 1865. A report in a prospectus describes anthracite coal beds in the Lackawanna Valley.

JONES, JAMES F.

1. A short description of the Pennsylvania anthracite coal field . . . . 57 p., illus., Philadelphia, [priv. pub.], [1892]. This is a semi-popular account of the occurrence and origin of the anthracite. Over 21 billion tons remain in reserve.

JONES, OWEN THOMAS

1. Edward Oscar Ulrich [1857-1944]: Geol. Soc. London Quart. Jour., v. 100, Proc. p. lviii-lix, 1945.

JONES, PAUL H., *see* Barksdale, H. C., 1.

JONES, THOMAS HENRY

1. (and Heeren, L.). [Map of] Oil and gas fields of Pennsylvania. Scale about 1 inch to 6 miles, Pa. Geol. Survey, 1953.
2. (and Cate, A. S.). Preliminary report on a regional stratigraphic study of Devonian rocks of Pennsylvania: Pa. Geol. Survey 4th ser., Spec. Bull. 8, 5 p., illus., 1957. A detailed discussion of Devonian rocks includes isopach and/or lithofacies maps of the Helderberg Group, Shriver Formation, Ridgley Formation, the Onondaga Group, the Hamilton Group, Tully Formation, and the Upper Devonian Series.

JONES, THOMAS RUPERT, 1819-1911.

1. A monograph of the fossil Estheriae. 134 p., illus., London, Palaeontographical Soc., 1862. *Leaia leidyi* from [Mississippian] rocks in Schuylkill Co., and *Estheria ovata, Candona (?) rogersii* and *C. emmonsi* from Triassic rocks in Chester Co. are described and illustrated.
2. On fossil Estheriae and their distribution: Geol. Soc. London Quart. Jour., v. 19, p. 140-157, 1863. A monographic work includes a change of name of *Cyprieandea leidyi* to *Leaia leidyi* for some branchiopods from the [Mississippian] rocks of Schuylkill Co.
3. On some fossil Estheriae [Bucks Co.]: Geol. Mag. 3d dec., v. 7, p. 385-390, illus., London, 1890. *Estheria lewisii* from Triassic rocks in Bucks Co. is described and illustrated. Some others, unidentified, are also discussed.
4. On some more fossil Estheriae [Chester Co.]: Geol. Mag. 3d dec., v. 7, p. 49-57, illus., London, 1891. *Estheria hindei* from Triassic black shale near Phoenixville, Chester Co., is described and illustrated.

JONES, VERNER, *see* Robinson, J. F., 2.

JONGMANS, WILLIAM JOSEPHUS

1. (and Gothan, W.). Florenfolge und vergleichende Stratigraphie des Karbons der oestlichen Staaten Nord-Amerika: Geol. Bur. Nederl. Mijnb. Jaarversl. 1933, p. 17-44. Heerlen, 1934; review, in French, by P. Bertrand, Soc. Géol. Nord Annales, v. 60, p. 25-38, Lille, [1939?]. Plants are listed from the various units in the [Pennsylvanian] and [Mississippian] Systems of the Commonwealth, and correlations are made with nearby states and Europe.

KAISER, E. P.

1. (and Page, L. R.). Distribution of uranium deposits in the United States, *in* Selected papers on uranium deposits in the United States: U. S. Geol. Survey Circ. 220, p. 1-7, illus., 1952. Maps show the uranium distribution in the Commonwealth. Uranium occurs with stratigraphic and some structural control.

KALM, PETER, 1716-1779.

1. Travels into North America, translated by J. R. Forster, 2d ed., 2 v., 414, 423 p., illus., London, T. Lowndes 1772; also other editions. A rough sketch of the geology, mineralogy, and geography of the state is included.

KARDOS, WILLIAM G.

1. A gamma ray log analysis of selected Chemung sands of west central Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1958.

KATZ, SAMUEL

1. Seismic study of crustal structure in Pennsylvania and New York: Columbia Univ., Lamont Geol. Obs. Tech. Rept. Seismology 32, 23 p., illus., 1951; Seismol. Soc. America Bull., v. 45, p. 303-325, illus., 1955. Seismograms recorded from blasting in Mifflin Co. are interpreted. There is an essentially unlayered crust with elastic wave velocities increasing with depth. The average crustal thickness is 34.4 km. Other wave velocities are discussed.

KAUFFMAN, MARVIN EARL

1. Statistical analysis of certain characteristics of the Susquehanna River terrace deposits. M. S. thesis, Northwestern Univ., 1957.

KAY, GEORGE MARSHALL

1. Taconic disturbance and associated events [abs.]: Geol. Soc. America Bull., v. 51, p. 1932, 1940.
2. Chemical lime in central Pennsylvania: Econ. Geology, v. 38, p. 188-203, illus., 1943. The Valentine Member of the Curtin Limestone of Middle Ordovician age is the biggest source of pure limestone in the area. It is described in detail; sections are measured. It is up to 90 feet thick, and is absent in some areas due to post-Valentine erosion.
3. Geosynclines in continental development: Science, v. 99, p. 461-462, 1944. A discussion of types of geosynclines includes examples taken from the Commonwealth. The whole is very generalized and no new data are given.
4. Middle Ordovician of central Pennsylvania—Part 1, Chazyan and earlier Mohawkian (Black River) formations,—Part 2, Later Mohawkian (Trenton) formations: Jour. Geology, v. 52, p. 1-23, 97-116, illus., 1944. The Chazyan and Mohawkian stages consist of 1500 feet of limestone and shale. The various formations are described and discussed. Fossils are listed.
5. North American geosynclines: Geol. Soc. America Mem. 48, ix, 143 p., illus. incl. maps, 1951. A detailed description and discussion of types of geosynclines include examples from the Commonwealth. Central Pennsylvania was in a miogeosyncline during the Cambrian, in an exogeosyncline from the Upper Ordovician to Mississippian, and in a miogeosyncline again in the Pennsylvanian. Stratigraphic details are included.

KEHN, THOMAS MATHEW, *see also* Arndt, H. H., 1; Wood, G. H., Jr., 3.

1. (and Wagner, H. C.). Geology of anthracite in the eastern part of the Shenandoah Quadrangle [Schuylkill Co.], Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 19, (2 sheets). Scale 1:12,000 (1 inch to 1000 feet), with sections and text, 1955. A brief but pithy text accompanies a coal outcrop map, a structure contour map of the Buck Mountain coal bed, and cross sections.

KEITH, MACKENZIE LAWRENCE, *see* Degens, E. T., 1, 2.

KELL, JAMES A.

1. Magnetometer survey of possible fault, Northampton County, Pennsylvania. M. S. thesis, Lehigh Univ., 1952.

KELLETT, BETTY, *see* Bassler, R. S., 2.

KELLUM, LEWIS BURNETT

1. Memorial to Ermine Cowles Case (1871-1953): Geol. Soc. America Proc. 1954, p. 93-101, port., 1955.

KEMNITZER, WILLIAM J., *see* Arnold, R., 1.

KEMP, JAMES FURMAN, 1859-1926.

1. Edmund Otis Hovey, 1862-1924: Nat. History, v. 24, p. 705-709, port., 1924.
2. Memorial of Edmund Otis Hovey [1862-1924]: Geol. Soc. America Bull., v. 36, p. 85-100, port., 1925.

KEYES, CHARLES ROLLIN, 1864-1942.

1. Origin of anthracite: Am. Geologist, v. 13, p. 411-415, 1894. Support for the theory of anthracite formation by dynamic energy is given in opposition to the theory of formation by depositional-weathering differences. The Commonwealth is used as an example.
2. Synopsis of American Paleozoic echinoids: Iowa Acad. Sci. Proc., v. 2, p. 178-194, illus., 1895. *Lepidechinus rarispinus* Hall is described. It is from Devonian Chemung Sandstone near Meadville, Crawford Co.
3. W J McGee [1853-1912], geologist, anthropologist, hydrologist: Annals of Iowa 3d ser., v. 11, p. 180-187, port., 1913.

4. Life and work of Charles Abiathar White [1826-1910]: Annals of Iowa 3d ser., v. 11, p. 497-504, ports., 1914.
5. John Casper Branner [1850-1920]: Pan-Am. Geologist, v. 37, p. 257-266, port., 1922.
6. Rollin D. Salisbury [1858-1922]: Pan-Am. Geologist, v. 38, p. 97-104, port., 1922.
7. Geological pioneering of Jules Marcou [1824-1898]: Pan-Am. Geologist, v. 40, p. 321-332, port., 1923.
8. Thomas Chrowder Chamberlin [1843-] at fourscore: Pan-Am. Geologist, v. 40, p. 81-94, ports., 1923.
9. Anthony Wayne Vogdes [1844-1924]: Pan-Am. Geologist, v. 41, p. 161-168, ports., 1924.
10. Edmund Otis Hovey [1862-1924]: Pan-Am. Geologist, v. 42, p. 321-330, ports., 1924.
11. John Mason Clarke [1857-1925], paleontologist: Pan-Am. Geologist, v. 44, p. 1-16, port., 1925.
12. William Maclure [1763-1839], father of modern geology: Pan-Am. Geologist, v. 44, p. 81-94, port., 1925.
13. [Edward Drinker] Cope [1840-1897] and American geology: Pan-Am. Geologist, v. 54, p. 1-16, 1930.
14. Warren Upham [1850-1934], glacialist: Pan-Am. Geologist, v. 61, p. 321-328, port., 1934.
15. William Morris Davis [1870-1934] and American physiography: Pan-Am. Geologist, v. 62, p. 1-16, 1934.
16. Henry Fairfield Osborn [1857-1935], modern paleontologist: Pan-Am. Geologist, v. 65, p. 161-178, port., 1936.
17. William Phipps Blake [1826-1910], pioneer of southwest: Pan-Am. Geologist, v. 72, p. 1-8, 1939.
18. Paleontological achievements of Fielding Bradford Meek [1817-1876]: Pan-Am. Geologist, v. 74, p. 1-12, port., 1940.
19. Dr. Charles Rollin Keyes [1864-1942]: Pan-Am. Geologist, v. 77, p. 321-322, port., 1942.

KIDDA, MICHAEL LAMOND

1. Geology of part of the southern anthracite coal field in the vicinity of Tamaqua [Schuylkill Co.], Pennsylvania. M. S. thesis, Univ. Ill., 1953.

KIDWELL, C. H.

1. Analysis of a brine from the Ligonier well in [Westmoreland Co.] Pennsylvania: Wash. Acad. Sci. Jour., v. 10, p. 385-389, 1920. Water from 6822 feet deep is analyzed. It is over three times as highly mineralized as sea water.

KINDLE, EDWARD MARTIN, 1869-1940, *see also* Prosser, C. S., 1.

1. Notes on the range and distribution of *Reticularia laevis* [Columbia Co.]: Jour. Geology, v. 14, p. 188-193, 1906. A discussion of the occurrence of this form in the Ithaca fauna of the Upper Devonian Series in New York includes references to its occurrence in Columbia Co. at Catawissa. The associated fauna is listed.

KING, B. C.

1. Maryland and Pennsylvania, Part 2 *of* Structural geology, the Appalachians, *in* [Recent advances in] Geology: Science Progress, v. 43, p. 683-692, illus.. London, 1955. This is a review, or tying together, of much of the work done in the Commonwealth, regarding structural interpretation, since 1950. No new data are included, however. The works of Agron, Campbell, Ch'ih, and Gair are analyzed.

KING, PHILIP BURKE

1. An outline of the structural geology of the United States: Internatl. Geol. Cong. 16th, United States 1933, Guidebook 28, 57 p., illus., 1932. A generalized description of the Appalachian region includes the Commonwealth. A very generalized map of the United States is included.
2. (and others). Tectonic map of the United States, 1944. 2 sheets, scale 1:2,500,000 (about 1 inch to 40 miles), with text, Tulsa, Am. Assoc. Petroleum Geologists, and Wash., D. C., Natl. Research Council, 1944; summary, Science, v. 101, p. 577, 1945; Wash. Acad. Sci. Jour., v. 30, p. 135, 1946. The tectonic framework of the Commonwealth is included.

3. Memorial to Nelson Horatio Darton [1865-1948]: Geol. Soc. America Proc. 1948, p. 145-169, port., 1949.
4. The tectonics of middle North America—Middle North America east of the Cordilleran System. xix, 203 p., illus. incl. geol. maps, Princeton, N. J., Princeton Univ. Press, 1951. The Commonwealth is included in a detailed resumé of the structural geological history of the continent. The Allegheny Synclinorium and central Appalachian Mountains comprise the Commonwealth. Each is outlined in detail.
5. The evolution of North America. 189 p., illus., Princeton, N. J., Princeton Univ. Press, 1959. A survey of the historical geology of North America, with emphasis on structural geology, includes the Commonwealth.

KINGSLEY. J. S.

1. (and others). Samuel Hubbard Scudder [1837-1911]: Psyche, v. 18, p. 175-192, port., 1911.

KIRGIS, FREDERIC L.

1. (and Rice, W. E., and Moran, H. E.). Typical analyses, bituminous coals produced in District 1 (central Pennsylvania . . .). Data book, v. 2, 18 p., illus., Washington, D. C., U. S. Bur. Mines and U. S. Office of Bituminous Coal Consumers Council, 1941. [not seen]

KJELLESWIG-WAERING, ERIK N.

1. The Mazon Creek eurypterid; a revision of the genus *Lepidoderma:* Ill. State Mus. Sci. Papers, v. 3, no. 4, 46 p., illus., 1948. *Lepidoderma approximatum* from Devonian rocks in Warren Co., *L. pennsylvanicum* from Pennsylvanian rocks in Venango Co., and *L. mansfieldi* and *L. potens* from Pennsylvanian rocks in Beaver Co. are described and discussed.
2. A taxonomic review of some late Paleozoic [Beaver Co.] Eurypterida: Jour. Paleontology, v. 33, p. 251-256, illus., 1959. *Mycterops ordinatus,* named as a fish by Cope in 1886, is redescribed and illustrated as a eurypterid. It is from the Darlington black shale, near Cannelton.

KLEIN, MARGUERITE M.

1. Garlands' (Long Quarry) Cave [Fulton Co.]: D. C. Speleograph, v. 10, no. 3, p. 2-4 (‡), illus., 1955. The cave is described in considerable detail; a sketch map is included.

KLEIN, N. H., *see* Van Tuyl, D. W., 3.

KLEMIC, HARRY, *see also* McKeown, F. A., 1; Stern, T. W., 1.

1. A study of the uranium deposit near Mauch Chunk [Carbon Co.], Pennsylvania. M. S. thesis, Pa. State Coll., 1952.
2. (and Baker, R. C.). Occurrences of uranium in Carbon County, Pennsylvania: U. S. Geol. Survey Circ. 350, ii, 8 p., illus., 1954; U. S. Geol. Survey Trace Elem. Inv. 503. 22 p. (‡), illus., 1954. Uranium vanadates, carbonates, and silicates occur in coarse graywacke conglomerate in the Pennsylvanian Pottsville Formation. Autunite and uranium silicates occur in graywacke sandstones in the Devonian Catskill Formation. Analyses are made, and deposits are described.
3. Pennsylvania, *in* Northeast district, *in* Reconnaissance for uranium in the United States: U. S. Geol. Survey Trace Elem. Inv. 490, p. 208-209 (‡), 1954. Reference is made to, but no details are given for, reported uranium occurrences in Devonian rocks in Fulton, Dauphin and Huntingdon Cos., in Mississippian rocks in Luzerne Co., and in Triassic rocks in Bucks Co. All the deposits are small and spotty.
4. Appalachian region—Mauch Chunk [Carbon Co.] Quadrangle, *in* Uranium in sandstone deposits outside the Colorado Plateau: U. S. Geol. Survey Trace Elem. Inv. 590, p. 196-198 (‡), illus., 1955. Besides the occurrence of uranium-bearing minerals in Carbon Co., reports are made of uranium finds throughout the Commonwealth. All are in the Devonian Catskill Formation.

KNEASS, S. H., *see* Bear Valley Coal Company, 1.

KNIGHT, C. W., *see* Campbell, W., 1, 2.

KNOPF, ADOLPH

1. Biographical memoir of Edward Salisbury Dana, 1849-1935: Natl. Acad. Sci. Biog. Mem., v. 18, p. 349-365, port., 1938.
2. Charles Schuchert, 1858-1942: Natl. Acad. Sci. Biog. Mem., v. 27, p. 363-389, port., 1952.

KNOWLTON, FRANK HALL, 1860-1926.

1. Memoir of W J McGee [1853-1912]: Geol. Soc. America Bull., v. 24, p. 18-29, port., 1913.
2. Relations between the Mesozoic floras of North and South America: Geol. Soc. America Bull., v. 29, p. 607-614, 1918. There is very little demonstrable relationship between the Mesozoic floras (Triassic in the Commonwealth) of North and South America.

KOBAYASHI, TEIICHI

1. The Ozarkian question and my view: Geol. Soc. Tokyo Jour., v. 40, p. 49-64, illus., 1933 [in Japanese], English resumé, p. 65-69; Pt. 2, v. 41, p. 97-118, illus., 1934 [in Japanese], English resumé, p. 119-124. Stratigraphically and paleontologically, the most radical discontinuity lies within the Ozarkian System, as proposed by Ulrich, rather than at the top of it.

KOPPE, EDWIN F.

1. Areal distribution of partings in the Upper Freeport coal, Freeport Quadrangle [Allegheny, Butler, Armstrong, Westmoreland Cos.], Pennsylvania: Pa. Acad. Sci. Proc., v. 32, p. 128-132, illus., 1958. Studies of the composition and distribution of clay and shale partings suggest, in this area at least, that (1) areas lacking partings represent topographic highs, (2) single partings near the base of the seam designate the margins of the high areas, and (3) areas with two or more basal partings indicate the low areas of earliest (peat) accumulation.
2. Grahamite dikes in the Pittsburgh coal, Washington County, Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1632, 1959.
3. Some geological factors affecting the Upper Freeport coal and its quality [western Pa.] [abs.]: Mining Eng., v. 11, p. 661, 1959.

KRAFT, JOHN CHRISTIAN, *see* Swain, F. M., Jr., 1.

KREIDLER, WILLIAM LYNN

1. Selected deep wells and areas of gas production in eastern and central New York: N. Y. State Mus. and Sci. Service Bull. 373, 243 p., illus., 1959. The data are in tables. Some of the wells are in Susquehanna, Bradford, Tioga, and Potter Cos. Depths to the Tully, Onondaga, and Oriskany Formations are included. Only a few wells penetrate below the Oriskany Sandstone. Maps show locations, Oriskany Sandstone distribution, and names of fields.

KROPFF, FREDERICK C., *see* Roberts, W. F., 10, 11, 17.

KRUMBEIN, WILLIAM CHRISTIAN

1. Occurrence and lithologic associations of evaporites in the United States: Jour. Sed. Petrology, v. 21, p. 63-81. illus., 1951. The Silurian salt deposits of the Commonwealth are included on a map of the United States. Few data are given. The Pennsylvania salt beds are connected with those in New York.

KRYNINE, PAUL DIMITRI

1. Differentiation of sediments during the life history of a landmass [Pa.] [abs.]: Geol. Soc. America Bull., v. 52, p. 1915, 1941.
2. Paleogeographic and tectonic significance of graywackes [Pa.] [abs.]: Geol. Soc. America Bull., v. 52, p. 1916, 1941.
3. Paleogeographic and tectonic significance of sedimentary quartzites [central Pa.] [abs.]: Geol. Soc. America Bull., v. 52, p. 1915-1916, 1941.
4. Dolomites [central Pa.] [abs.]: Geol. Soc. America Bull., v. 68, p. 1757, 1957.

KUHN, THOMAS ALFRED

1. The geology of a portion of the Berlin Quadrangle [Somerset Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1952.

KUMMEL, HENRY BARNARD, 1867-1945

1. The Newark System or Red sandstone belt [New Jersey]: N. J. State Geologist Ann. Rept. 1897, p. 25-159, illus., 1898. A detailed description of Triassic sedimentary and igneous rocks in New Jersey includes many references to exposures in southeastern Pennsylvania.

KUNZ, GEORGE FREDERICK, 1856-1932

1. Gems and precious stones of North America. 336 p., illus., New York, Scientific Press, 1890. A popular treatise on gem types and occurrences includes much reference to the Commonwealth. Minerals are classed by groups, and occurrences are described. All those from the Commonwealth are in the crystalline rocks in the southeastern counties.

2. Memoir of Albert E. Foote [1846-1896]: Geol. Soc. America Bull., v. 7, p. 481-485, 1896.
3. Biographical sketch of the late L[ouis] P[ope] Gratacap [1851-1917]: Am. Mus. Jour., v. 18, p. 302-304, port. [p. 298], 1918.

KURTZ, ANNA E.

1. Formations adjacent to the Siluro-Devonic contact, Delaware Water Gap Quadrangle . . . [Monroe, Northampton Cos.], Pennsylvania. M. A. thesis, Columbia Univ., 1911.

KUTZ, D.

1. Barker Farm Cave, Blair Co.: Nittany Grotto Newsletter, v. 7, no. 1, p. 6 (‡), illus., 1958; Speleo Digest 1958, pt. 1, p. 1-84 (‡), illus., 1959. A brief description and a sketch map of the cave are given.

LAFAYETTE COLLEGE, DEPARTMENT OF GEOLOGY AND GEOGRAPHY

1. Field Trip A, North from Easton to slate and cement areas [Lehigh, Northampton Cos.], *in* Guidebook, Field Conf. of Pa. Geologists 19th, p. 27-31 (‡), illus., [1953]. This is a road log, with brief stop descriptions, of a trip to slate and cement quarries.
2. Field Trip C, North from Easton to Panther Valley anthracite region [northeastern Pa.], *in* Guidebook, Field Conf. of Pa. Geologists 19th, [Easton, Pa. 1953] p. 36-53 (‡), illus., [1953]. This is a road log of a field trip, with stop descriptions, from Easton, northward along the Lehigh River, and then westward to the Tamaqua area. Slate and coal are the economic deposits described.
3. (and McLaughlin, D. B.). Field Trip D, Southern Trip [Northampton, Bucks Cos.], *in* Guidebook, Field Conf. of Pa. Geologists 19th, [Easton, Pa. 1953] p. 54-64 (‡), illus., [1953]. This is a road log, with extensive descriptions, of a trip in the Triassic terrane of Bucks Co.

LAFFERTY, R. C.

1. Northern basin area [western Pa.], [Part 5] *of* Appalachian Region, *in* Ball, M. W., ed., Possible future petroleum provinces of North America: Am. Assoc. Petroleum Geologists Bull., v. 35, p. 453-457, illus., 1951; reprinted as separate volume by the Association, Tulsa, 1951. A brief review of recent petroleum exploration developments in the Commonwealth is given. No new data are included.

LAMB, FRANK D., *see* Sanford, R. S., 1.

LAMB, GEORGE FRANKLIN, *see* Stout, W. E., 1.

LANDIS, CHARLES, *see also* Hartman, F., 2.

1. Boalsburg Cave . . . Centre County, Pa.: Natl. Speleol. Soc. Bull. 15, p. 69, 1953; enlarged, Speleo Digest 1958, pt. 1, p. 1-8 (‡), illus., 1959. A brief description of the cave and a sketch map are given.
2. (and Brown, A.). Cave in Bellefonte [Centre Co.]: Nittany Grotto Newsletter, v. 7, p. 41, 45 (‡), illus., 1958. A new cave in Ordovician limestone is described and mapped.
3. (and others). Cave report: Nittany Grotto Newsletter, v. 8, p. 35-39 (‡), illus., 1959. Brief descriptions and maps of Arnold and Freeburg Caves in Snyder Co. and Naginny Quarry and Dump Caves in Mifflin Co. are given.

LANE, ALFRED CHURCH, 1863-1948.

1. Israel Cook Russell (1852-1906): Am. Acad. Arts and Science Proc., v. 53, p. 855-858, 1918.
2. John Casper Branner (1850-1922): Am. Acad. Arts and Science Proc., v. 70, p. 500-501, 1936.
3. Memorial to Arthur Winslow [1860-1938]: Geol. Soc. America Proc. 1938, p. 209-217, port., 1939.

LANE, E. C.

1. (and Garton, E. L.). Analyses of crude oils from some fields of [western] Pennsylvania and New York: U. S. Bur. Mines Rept. Inv. 3385, 68 p. (‡), 1938.

LANE, MAURICE V.

1. Geology of part of the upper Lewistown Valley of Mifflin County, Pennsylvania. M. A. thesis, Pa. State Univ., 1956.

LANNING, DAVID ROY

1. A study of the Oswego Sandstone and a consideration of its productive possibilities. M. S. thesis, Univ. Pittsburgh, 1947.

LAPHAM, DAVIS MORTIMER

1. Preliminary report on the chromite occurrence at the Wood Mine [Lancaster Co.] Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 153, 11 p., illus., 1958. An examination of the geologic environment of the chromite is made. Ultrabasic rocks intruded schists and gneisses; all are now altered. The chromite is a segregate of the ultrabasic rocks.
2. An inequilibrium modification of the corundum structure: Am. Mineralogist, v. 44, p. 670-672, illus., 1959. The presence of well-crystallized mica in K-bentonite from Perry Co. may govern the appearance of a metastable alumina polymorph immediately previous to the formation of corundum. The polymorph has a structure approaching that of corundum and is called μ alumina for reference in x-ray work.
3. Magnetite in microcrystalline quartz, Lancaster County, Pa.: Am. Mineralogist, v. 44, p. 672-674, illus., 1959. Glassy-appearing magnetite originated from pre-existing iron-magnesium silicates by the alteration and remobilization of a serpentinized ultramafic along its contact with a quartz-pegmatite intrusion.
4. (and Geyer, A. R.). Mineral collecting in Pennsylvania: Pa. Geol. Survey 4th ser., Bull. G-33, 74 p., illus., 1959. A brief summary of the nature and origin of minerals is followed by a description of various mineral collecting locations.

LARSEN, ESPER SIGNIUS, JR.

1. Memorial to Kirk Bryan [1888-1950]: Geol. Soc. America Proc. 1950, p. 91-96, port., 1951.

LATSHAW, WARREN LEROY

1. An insoluble residue study of the Conococheague Dolomite near Leesport [Berks Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1950.

LATTMAN, LAURENCE HAROLD

1. (and Nickelsen, R. P.). Photogeologic fracture-trace mapping in Appalachian Plateau [Clearfield Co.]: Am. Assoc. Petroleum Geologists Bull., v. 42, p. 2238-2245, illus., 1958. An aerial photo of part of the Houtzdale Quadrangle is used in a study to determine whether directions of photogeologic fracture traces are related to bedrock joints. There appears to be significant relation, and fracture-trace mapping may be used to extend bedrock joint mapping into areas covered by soil and trees.
2. Cross section of a small flood plain in the Appalachian Plateau [abs.]: Geol. Soc. America Bull., v. 70, p. 1635-1636, 1959.

LAUER, A. W.

1. The petrology of reservoir rocks and its influence on the accumulation of petroleum: Econ. Geology, v. 12, p. 435-472, illus., 1917. The importance of induced porosity in reservoir rocks is discussed, with many examples being taken from the Commonwealth.

LAYMAN, FREDERICK G.

1. A petrographic study of the magnetite replacement in Pre-Cambrian rocks, Chester County, Pennsylvania. M. S. thesis, Lehigh Univ., 1952.

LEBLING, CLEMENS

1. Die Senkungen im Berliche der Newarktrias. [Part] I *of* Tektonische Forschungen in den Appalachen: Geol. Rundschau, v. 5, p. 449-462, illus., Leipzig, 1915. A generalized description of the settling of the Newark Basin and the sedimentation resulting therefrom includes references to exposures in the Commonwealth. The major theme is the structural theory of the basin formation.
2. Tektonische Forschungen in den Appalachen, [Part] 2: Geol. Rundschau, v. 5, p. 511-537, illus., Leipzig, 1915. A general review of the history of the Appalachian Geosyncline is given. The relationships between the rocks and the sedimentary history is pointed out. Tertiary benches are discussed. The Commonwealth is included as part of a larger regional study.

LEE, O. IVAN

1. A famous forgotten quartz crystal locality, Crystal Hill near Delaware Water Gap [Monroe Co.], Penna.: Rocks and Minerals, v. 25, p. 372-373, illus., 1950. Descriptions of the locality and crystals are given. The origin of the minerals is not discussed.

LEIDY, JOSEPH, 1823-1891.

1. Notices of some remains of extinct fishes: Acad. Nat. Sci. Philadelphia Proc. 1857, [v. 9] p. 167-168, 1858. *Turseodus acutus* from the Triassic Lockatong Formation of Chester Co. is described.

LEIN, CARL A.

1. Geology of Chestnut Ridge from Saylorsburg to Kinkletown, Monroe County, Pennsylvania. M. S. thesis, Lehigh Univ., 1952.

LEONARD, ARNOLD D.

1. The Pocono Sandstone neighboring the northern anthracite coal basin [northeastern], Pennsylvania. M. S. thesis, Pa. State Coll., 1953.

LESLEY, J. PETER, 1819-1903.

1. To John Ely, and others [Report on Barclay Railroad and Coal Co. property, Bradford Co.]. 7 p., illus., [n. p.], 1854. Iron ore and bituminous coal are described in this report designed for a prospectus.
2. [Copper strata in northeastern Pennsylvania] [abs.]: Am. Phil. Soc. Proc., v. 7, p. 329-330, 1861.
3. Report on the lands . . . *in* Moorehead, William G. [Prospectus of] Preston Coal and Improvement Co., Schuylkill County, Pa., p. 27-45, illus., Philadelphia, King and Baird, 1864. A report for a stock prospectus includes a description of some of the anthracite coal seams.
4. Report on Thos. Moore's coal mines, Westmoreland County, Pa. 14 p., illus., Pittsburgh, W. S. Haven, 1864. A description of the mineral resources of the land includes analyses of the coals.
5. (and Boal, W. H.). Reports on the P. Kerr and Co. coal lands, in Washington County, Pa. 17 p., illus., Philadelphia, Sherman and Co., [? 1864]. Coal and limestone are the principle minerals of value; fire clay and stone are also present. The general stratigraphy of the area is discussed.
6. Geological report on the Red Bank Furnace property in Clarion County, Pa. 20 p., illus., Philadelphia, Sherman and Co., 1865. This is a report designed for a prospectus. The [Pennsylvanian] rocks and coals of the region are described. The Upper Freeport is the most important coal. The oil potentials are described in the form of a description of the subsurface stratigraphic section. Fissures are considered to be the main petroleum reservoirs as well as porous rocks. Oil occurs by chance, and "all straight-edge locations of wells upon a map are mere charlatanry". He recommends drilling to the [Devonian] rocks.
7. Mont Alto lignite and Appalachian erosion. 30 p., illus., Philadelphia, 1865; summary, Am. Jour. Sci. 2d ser., v. 40, p. 119-122, 1865. About 16 feet of lignite were encountered 40 feet below the surface in Franklin Co. It is interbedded with sand. Woody logs were recovered. It is compared to and correlated with the Brandon lignite deposits in Vermont. It is not related to the overlying iron ore, which is also described.
8. Report . . . upon the property of the Youghioghany Iron Company, situated in Dunbar Township, Fayette County, Pa. 12 p., illus., [n. p.] [? 1865]. The occurrence of the Pittsburgh coal bed and limestone is described.
9. Prof. J. P. Lesley's report of oil, at Brady's Bend [Armstrong Co.]. Pennsylvania. 7 p., illus., New York, Baker and Godwin, 1869. The lowest coal bed at the river level at Brady's Bend is 600 feet above the river level in the Oil Creek area of Venango Co. Since the oil zones lie below the surface at Oil Creek, their distance below the surface at Brady's Bend is 750 feet at least. Thickness variations are uncalculable as the rocks are ruptured. He recommends drilling as far up-dip as possible.
10. A geological hand atlas of the sixty-seven counties of Pennsylvania: Pa. Geol. Survey 2nd, X, cxii, atlas of maps, 1885. A general description of the structure of the Commonwealth is given, with an even briefer discussion of the characteristics of each county, and with sixty-seven small geological maps, one of each county. The scale is 6 miles per inch.

LESLEY, JOSEPH

1. Geological report on the Roberts' tract, Elk County. Pennsylvania, *in* The Erie Mining Company and the New York and Erie Mining Company, p. 15-28, illus., Philadelphia, Sherman and Co., 1865. The [Pennsylvanian] rocks and

enclosed coal beds are described from the Johnsons' Run coal field. Four major seams are present.

LESQUEREUX, LEO, 1806-1889.

1. A species of fungus recently discovered in the shales of the Darlington coal bed (lower Productive Coal Measures, Allegheny Series) at Cannelton, in Beaver Co., Pa.: Am. Phil. Soc. Proc., v. 17, p. 173-175, illus., 1878; Pa. Geol. Survey 2d, Q, p. xlvii-li, illus., 1878; discussion with title, Remarks upon a supposed fossil fungus from the Coal Measures, by J. F. James: Cincinnati Soc. Nat. Hist. Jour., v. 8, p. 157-159, 1885. *Rhizomorpha sigillariae* is found associated with the bark of a *Sigillaria;* it is described and illustrated. James calls it an insect-larval boring.
2. Description of the coal flora of the Carboniferous Formation of Pennsylvania and throughout the United States: Pa. Geol. Survey 2d, P, 3 v., 977 p., illus., 1880; corrections by C. D. White, with title, Some erroneous age records of Paleozoic plant genera: Science, v. 79, p. 77-78, 1934. Detailed descriptions and illustrations of several hundred fossil plants include locations. A general discussion of their stratigraphic and geographic distribution is included.

LESSENTINE, ROSS H.

1. Areal and structural geology in Buckingham Valley [Bucks Co.], Pennsylvania. M. S. thesis, Lehigh Univ., 1952.

LEUCHS, KURT

1. Charles Schuchert [1858-1942]: K. Akad. Wiss. Wien Almanach 1947, v. 97, p. 317-320, Vienna, 1948.

LEVERETT, FRANK, 1859-1943.

1. Dr. I[srael] C[harles] Russell [1852-1906]: Mich. Acad. Sci. Bull., v. 3, no. 1, p. 1-2, 1906.
2. Comparison of North American and European glacial deposits: Zeitschr. Gletscherkunde, v. 4, p. 241-295, 321-342, Berlin, 1910. "Old drift" of the Allegheny Plateau of northwestern Pennsylvania is described. It is not necessarily pre-Kansan, but it is very old. It cannot be successfully correlated with European stages either, but it may be a deposit of the second glacial stage.
3. (and Taylor, F. B.). The Pleistocene of Indiana and Michigan and the history of the Great Lakes: U. S. Geol. Survey Mon. 53, 529 p., illus., 1915. A detailed history of the Great Lakes includes that of Erie Co. Lakes Maumee, Arkona, Whittlesey, Wayne, Warren, Lundy, and Erie are described.

LEVORSEN, ARVILLE IRVING

1. Studies in paleogeology: Am. Assoc. Petroleum Geologists Bull., v. 17, p. 1107-1132, illus., 1933. Paleogeologic maps show the areal geology and the regional structure of the United States at the beginning of Mississippian time, in early Pennsylvanian time, and at the beginning of Cretaceous time. The Commonwealth is included.

LEWIS, HENRY CARVILL, 1853-1888.

1. The optical characters of some micas [southeastern Pa.]: Acad. Nat. Sci. Philadelphia Proc. 1880, p. 244-251; Min. and Geol. Sec. Proc. 1, p. 8-15, 1880. Micas from many different places in the southeastern counties are listed with "mean apparent optic-axial angular divergence of white light."
2. The antiquity and origin of the Trenton gravels, *in* Primitive industry, by Charles C. Abbott, p. 523-551, Salem, Mass., George A. Bates, 1881; also as separate, 31 p., 1881. A study of the alluvial material in the Delaware River Valley is made to determine the age of the implement-bearing Trenton Gravel. The Trenton Gravel overlies and is in channels in the Philadelphia Brickclay, which is considered to be [Wisconsin]. Therefore, the Trenton Gravel is post-glacial.
3. The direction of glaciation as ascertained by the striae [abs.]: British Assoc. Adv. Sci. Rept. 55, p. 1019-1020, London, 1886.

LIBBY, WILLARD FRANK, JR., *see also* Arnold, J. R., 1.

1. Radiocarbon dating. vii, 124 p., illus., Chicago, Univ. Chicago Press, 1952; 2d ed., ix, 175 p., illus., 1955. A date from Bridgeville, Allegheny Co., is included in a list of dates given as examples of the technique. The peat is older than 16,000 years.

LICASTRO, P. H., *see* Howell, B. F., Jr., 1.

LILLEY, ERNEST RAYMOND

1. Coal as an aid in oil exploration: Eng. Min. Jour.-Press, v. 117, p. 1009-1012, illus., 1924. The relationship between coal-volatile-content and petroleum occurrence is described, with examples from the Commonwealth. Isovol maps are included.

LINDGREN, WALDEMAR, 1860-1939.

1. Biographical memoir of George Perkins Merrill, 1854-1929: Natl. Acad. Sci. Biog. Mem., v. 17, p. 31-53, port., 1937; preprint 1935.

LINEHAN, DANIEL

1. Seismic survey at Martins Creek [Northampton Co.], Pennsylvania, *in* Geophys. Case Histories, v. 2, p. 635-640, illus., 1956. A bedrock of hard and soft limestone and the depth of overburden is outlined by a seismic survey.

LINES, EDWIN F., *see* Fuller, M. L., 1.

LINK, HOWARD B., *see* Ash, S. H., 4.

LINN, EARL H.

1. "Devonian oil and gas possibilities in central Pennsylvania": Am. Petroleum Inst. Div. Production Paper 826-24-A, 10 p., illus., [1953]. A review of Devonian stratigraphy includes some small-scale isopach and lithofacies maps of different units. Petroleum and natural gas potentials are discussed.
2. Future [petroleum] possibilities in the Appalachian Basin: Petroleum Engineer, v. 27, no. 5, p. B32-B36, illus. incl. port., 1955. This is a review of the general geology of the area, including that of the Commonwealth. Each System is discussed regarding its petroleum potential.
3. Sedimentation—key to Appalachian production: Oil and Gas Jour., v. 54, no. 52, p. 165-168, 170, 173, illus., 1956. This is an exhortation to consider the Cambrian and Lower Ordovician formations of western Pennsylvania as possible petroleum reservoir beds; stratigraphic traps, resulting from irregular deposition, are given as the goal. Generalized isopach maps are included.

LIPMAN, CHARLES BERNARD, 1883-1944.

1. Living microörganisms in ancient rocks [Schuylkill Co.]: Jour. Bacteriology, v. 22, p. 183-198, illus., 1931. Samples of anthracite coal, from a depth of 1800 feet, contain bacteria which are interpreted as being Pennsylvanian in age and which have been lying dormant until treated.

LOBECK, ARMIN KOHL, 1886-1958.

1. A physiographic diagram [map] of the United States. Scale, 1:3,000,000. Chicago, A. J. Nystrom and Co., 1921.
2. Physiographic diagram of the United States. Small-scale edition. 8 p., map, [? Madison, Wisc.], 1922.
3. Physiographic provinces of North America. Physiographic map and diagram of North America, with brief notes. Scale about 1:12,000,000, New York, Columbia Univ. Geographical Press, 1948. A sketch of the United States includes the Commonwealth.
4. Physiographic diagram of Pennsylvania. Preliminary sketch ed., 2 sheets, scales 1:1,000,000 (about 1 inch to 16 miles), and 1:450,000 (about 1 inch to 6½ miles), New York, Columbia Univ. Geographical Press, 1951.

LOCKETT, JOHN ROBERT

1. Development of structures in basin areas of northeastern United States: Am. Assoc. Petroleum Geologists Bull., v. 31, p. 429-446, illus., 1947. Stratigraphic evidence is cited to substantiate the premise that major positive structural features are supported by crystalline cores of Precambrian mountain ranges, and that the dominant crustal movement during the entire Paleozoic Era was subsidence of the intervening areas. The Pittsburgh-Huntingdon Basin in western Pennsylvania is included as an example in the discussion.

LOGUE, LESTER LLOYD

1. Gravity anomalies of Texas, Oklahoma, and the United States: Oil and Gas Jour., v. 52, no. 50, p. 132-135, illus., 1954. The text does not discuss the Commonwealth, but a special sheet has a small scale map of gravity anomalies of the United States which includes those of Pennsylvania.

LOHMAN, STANLEY WILLIAM

1. Pennsylvania, *in* Water levels and artesian pressure in observation wells in the United States in 1935: U. S. Geol. Survey Water-Supply Paper 777, p. 161-169, tables, 1936; . . . in 1936, no. 817, p. 260-301, tables, 1937. Levels

related to an arbitrary datum and dates are recorded in tables. Wells from many, but not all counties are included.

LOMBARD, AUGUSTIN E.

1. Appalachian and Alpine structures—a comparative study: Am. Assoc. Petroleum Geologists Bull., v. 32, p. 709-744, illus., 1948. Certain features in common between the two mountain systems are pointed out. Those of the Commonwealth are included. A general theory of mountain formation is considered.

LOMBARD, THOMAS C.

1. Prospectus of the Fuller Farm Oil Company . . . near Franklin . . . in Venango County. 12 p., illus., Boston, G. C. Rand and Avery, 1864. Oil is explained as coming from intersecting vertical and horizontal fissures in the [Devonian] Hamilton shales. The fissures converge on the Company property.

LOMBARD, WARREN R.

1. (and D'Ooge, M. L.). Israel Cook Russell [1852-1906]: Science, v. 24, p. 426-431, 1906.

LONG, MINER BARTON

1. Origin of the Conococheague Limestone. Ph.D. thesis, Johns Hopkins Univ., 1954.

LONG, MORRIS ANDREWS

1. Geology of the Millheim-Coburn-Aronsburg area [Centre Co.], Pennsylvania. M. S. thesis, Lehigh Univ., 1950.

LONGWELL, CHESTER RAY

1. Thomas Chrowder Chamberlin [1843-1928]: Geog. Review, v. 19, p. 164-165, 1929.
2. Arthur Keith, 1864-1944: Natl. Acad. Sci. Biog. Mem., v. 29, p. 190-200, port., 1956.

LUFT, STANLEY I.

1. Alteration and chromite mineralization in the Pennsylvania-Maryland state line serpentine belt. M. S. thesis, Pa. State Coll., 1951.

LULL, RICHARD SWANN, 1867-1957.

1. Memorial of Oliver Perry Hay [1846-1930]: Geol. Soc. America Bull., v. 42, p. 30-48, port., 1931.
2. Charles Schuchert [1858-1942]: Am. Jour. Sci., v. 241, p. 130-133, 1943.

LUSK, EDWIN W.

1. A study of the causes for local variations in rank of the Lower Kittanning and Lower Freeport coals in Clearfield County, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1958.

LUTSEY, IRA A., JR.

1. Geology in the vicinity of Monroe [Bucks Co.], Pennsylvania: M. S. thesis, Lehigh Univ., 1958.

LYCOMING COAL COMPANY

1. A brief description of the property belonging to the Lycoming Coal Company with some general remarks on the subject of the coal and iron business. 32 p., illus., Poughkeepsie, New York, P. Potter, 1828. This is a prospectus; three beds of coal, iron ore, limestone, and salt potential from a tract along Lycoming Creek in Lycoming Co. are described.

LYMAN, BENJAMIN SMITH, 1835-1920.

1. Report on the Painter Tract, near Connellsville [Fayette Co.] Pa. . . . . 13 p., illus., Philadelphia, Sherman and Co., [1866]. The [Pennsylvanian] rocks are described. Coal, iron ore, fire clay, and limestone are present and are discussed. Some reserve estimates are included.
2. Age of the Newark brownstone: Am. Phil. Soc. Proc., v. 33, p. 5-9, 1894. Paleontological evidence, including some from Bucks Co., is not conclusive in establishing the Triassic age of the red formations; they could be Permian.
3. Some New Red horizons [Montgomery Co.]: Am. Phil. Soc. Proc., v. 33, p. 192-215, illus., 1894; discussion by P. Frazer, Jr.. p. 215-216, 1894. Comparison of the various Triassic areas of the eastern United States with the Triassic area of Montgomery Co. is made. Fossils are listed.
4. Report on the New Red of Bucks and Montgomery Counties: Pa. Geol. Survey 2d, Summary Final Rept., v. 3, pt. 2, p. 2589-2638, illus. incl. geol.

map, 1895. In a detailed discussion of the Triassic beds, small units are described. The diabase is discussed in detail. Dolerite, gabbro, and epidiorite are common differentiates. Stone, lead, zinc, copper, gold, and umber are among the economic products.

5. *Scolithus linearis* burrows with orifice complete [Chester, Lehigh Cos.] [abs.]: Acad. Nat. Sci. Philadelphia Proc. 1909, p. 296-297, illus., 1909.

LYONS, PAUL LIGHTNER

1. A seismic reflection quality map of the United States: Geophysics, v. 16, p. 506-510, illus., 1951. The map includes the Commonwealth. The extreme southeastern area has no reflections; the general southeastern area has poor reflections; the central area has fair reflections, and the extreme northwestern portion has good reflections.

LYTLE, WILLIAM STUCKLEY, *see also* Fettke, C. R., 50, 51, 53; Ingham, A. I., 3.

1. Crude oil reserves of Pennsylvania: Pa. Geol. Survey 4th ser., Bull. M. 32, 256 p., illus., 1950; summary, Pa. Acad. Sci. Proc., v. 24, p. 203-207, 1950. All of the 164 oil fields of the Commonwealth are evaluated, and the method by which the reserves are calculated is described. Almost 3 billion barrels remain in the ground. Forty-five million barrels are primarily recoverable; 224 billion are recoverable primarily and secondarily; 449 billion are probably recoverable; and 848 million barrels are possibly recoverable.
2. The stratigraphic positions of the oil and gas sands in the Butler District [western Pa.]: Pa. Acad. Sci. Proc., v. 27, p. 120-124, illus., 1953. Devonian-Pennsylvanian rocks are described. Well-log data are cited for the correlations of many of the sandstone bodies in the Upper Devonian Series. The sandstone bodies are not sheet sands but grade laterally into other lithic units. The sandstones in the various areas are not continuous but do occupy similar, correlative, stratigraphic positions.
3. (and Heeren, L. A.). Oil and gas field atlas of the Butler quadrangle [Butler Co.], Pennsylvania: Pa. Geol. Survey 4th ser., Spec. Bull. 7, illus. 10 maps and tables, text on cover, 1955. Detailed, large-scale maps show land boundaries, well locations, oil field boundaries, and other data. A structure contour map on the Vanport Limestone is included, as are selected well record data.
4. Summary [of] secondary recovery operations in Pennsylvania to January 1, 1954, including petroleum reserves and production by counties: Pa. Geol. Survey 4th ser., Prog. Rept. 148, 23 p., illus., 1955. The data are tabulated by field; reserves are tabulated by county.
5. [Oil and gas] Developments in [western] Pennsylvania in 1956: Am. Assoc. Petroleum Geologists Bull., v. 41, p. 1010-1020, illus., 1957; Pa. Geol. Survey 4th ser., Prog. Rept. 151, 10 p., illus., 1957. A review of the exploration and production activity in the oil and gas fields for the year is given. Many tables are used.
6. John F[ranklin] Carll [1828-1904]—pioneer petroleum geologist and engineer: GeoTimes, v. 1, no. 9, p. 8-9, 14, port., 1957; Pa. Dept. Internal Affairs Monthly Bull., v. 25, no. 5, p. 19-22, illus., 1957.
7. [Oil and gas] Developments in [western] Pennsylvania in 1957: Am. Assoc. Petroleum Geologists Bull., v. 42, p. 1147-1158, illus., 1958; Producers Monthly, v. 22, no. 10, p. 33-38, illus., 1958; Natl. Oil Scouts and Landsmen's Assoc. Yearbook 1958, v. 28, p. 648-656, illus., 1958; (and others) Pa. Geol. Survey 4th ser., Prog. Rept. 154, 46 p., illus., 1958. Tables show the oil and gas drilling data for the year.
8. Cyrus D. Angell: GeoTimes, v. 4, no. 3, p. 18-19, 45, illus. incl. port., 1959. This man was important in the early development of the petroleum industry in the Commonwealth.
9. [Oil and gas] Developments in [western] Pennsylvania in 1958: Am. Assoc. Petroleum Geologists Bull., v. 43. p. 1144-1160, illus., 1959; Natl. Oil Scouts and Landsmen's Assoc. Yearbook 1959, v. 29, p. 573-581, illus., 1959; Producers Monthly, v. 24, no. 1, p. 14-16, 18, 19, illus., 1959; (and others) Pa. Geol. Survey 4th ser., Prog. Rept. 155, 44 p., illus., 1959. A review of oil and gas developments for the year includes the notice of the first offshore gas-well completion in Lake Erie.

10. Field Trip C, Erosion channel in Penn Dixie limestone mine [Butler Co.], *in* Field Conf. of Pa. Geologists 24th, Titusville 1959, p. 59-77 (‡), illus., [n. p.] [1959]. An annotated roadlog from Titusville southward to Butler describes historical sites and Devonian-Pennsylvanian outcrops along the way. Glacial features associated with Lake Watts are described also. The Vanport Limestone and a limestone mine are described. Post Vanport limestone-pre Kittanning Sandstone erosion features are described. A collapse structure is also present.
11. Ground water in Pennsylvania: Netherworld News, v. 6, p. 118-123 (‡), illus., 1958; Seleo Digest 1958, pt. 2, p. 2-1 - 2-11 (‡), illus., 1959. A summary of ground water principles includes many examples from the Commonwealth. No new data are included.
12. Introduction to bedrock and oil geology of northwestern Pennsylvania and the great oildorado, *in* Field Conf. of Pa. Geologists 24th, Titusville 1959, p. 12-35 (‡), illus., [n. p.] [1959]. A very lucid description of the history of the oil region in Venango Co. includes a discussion of the Devonian-Pennsylvanian rocks. The petrography and origin of the Venango sands are discussed; they are considered to be near-shore deposits.
13. Trip B, Bedrock and oil geology of northwestern Pennsylvania and the great oildorado, *in* Field Conf. of Pa. Geologists 24th, Titusville 1959, p. 36-58 (‡), illus., [n. p.] [1959]. This is a detailed, annotated road log from Titusville east to Tidioute, south to Tionesta, west to Rouseville, and north to Titusville (Crawford, Warren, Forest, and Venango Cos.). Historical sites, as well as Devonian and Mississippian outcrops, are visited.

McALLISTER, ETHEL M.

1. Amos Eaton, scientist and educator, 1776-1842. xiii, 587 p., illus. incl. ports., Philadelphia, Univ. Pa. Press, 1941.

McCALLUM, JOHN

1. Lower Cretaceous heavy-mineral suites from the New Jersey and Pennsylvania subsurface [abs.]: Geol. Soc. America Bull., v. 67, p. 1753-1754, 1956.

McCARTNEY, JAMES THOMAS

1. A study of the Seyler theory of coal reflectance: Econ. Geology, v. 47, p. 202-210, illus., 1952; discussion by C. A. Seyler, p. 211-214; reply by author, p. 214-215, 1952. The theory that anthraxylon and fusain have petrographic reflectance properties which will enable their recognition is tested. Some of the material used comes from the Commonwealth.

McCAUGHEY, W. J., *see* Greig, J. W., 1.

McCAULEY, JOHN F., *see also* Brummer, J. J., 1.

1. Preliminary report on the sedimentary uranium occurrences in the State of Pennsylvania. M. A. thesis, Columbia Univ., 1957; Pa. Geol. Survey 4th ser., Prog. Rept. 152, 22 p., illus., 1957. Deposits associated with copper sulphide minerals in shales in the northeastern counties are discussed. The radioactivity is concentrated in paleostream channels in the Devonian Catskill Formation. Other, non-copper associated occurrences, are in Carbon, Huntingdon, and Bucks Cos.
2. Redbed uranium occurrences in Pennsylvania [abs.]: Econ. Geology, v. 53, p. 931-932, 1958; Geol. Soc. America Bull., v. 69, p. 1610-1611, 1958.

MacCLINTOCK, PAUL

1. Glacial map of North America—5: Northeastern United States [abs.]: Geol. Soc. America Bull., v. 52, p. 1921-1922, 1941.
2. Leaching of Wisconsin glacial gravels in eastern North America [Monroe, Northampton Cos.]: Geol. Soc. America Bull.. v. 65, p. 369-383, illus., 1954. Depth of calcium carbonate leaching is used as a correlation criterion. Tazewell Drift can be recognized in the Commonwealth by its being leached to a depth of 15 feet. Cary Drift is recognized by its being leached 7 to 8 feet.

McGEE, W J, 1853-1912

1. Reconnaissance [Geological] map of the United States. Scale 1 inch to about 300 miles: U. S. Geol. Survey Ann. Rept., v. 14, pt. 2, pl. 2, 1894 [1893]. A map of the United States includes the Commonwealth.
2. (and others). Honors to James Hall [1811-   ] at Buffalo: Science new ser., v. 4, p. 697-717, illus. incl. ports, 1896.

McGEE, EMMA R.

1. Life of W J McGee [1853-1912]. . . . 240 p., port., Farley, Iowa, priv. printed, 1915.

McGLADE, WILLIAM G.

1. The geology of the north-central rectangle of the Wind Gap [Monroe Co.], Pennsylvania, Quadrangle. M. S. thesis, Pa. State Coll., 1952.

McGREGOR, JAMES HOWARD

1. The Phytosauria . . . : Am. Mus. Nat. Hist. Mem., v. 9, p. 29-101, illus., 1906. *Clepsysaurus pennsylvanicus* from Triassic rocks in Lehigh Co. and *Centemedon sulcatus* from Triassic rocks in Chester Co. are included in *Rhytiodon carolinensis.*

McGUCHEN, JOHN GRANVILLE

1. Honesdale paleocurrents in northeastern Pennsylvania: M. S. thesis, Lehigh Univ., 1949.

McKEE, EDWIN DINWIDDIE

1. (and others). Paleotectonic maps of the Triassic System: U. S. Geol. Survey Misc. Geol. Inv. Map I-300, 33 p., illus. incl. geol. maps, 1959. A brief text and time-rock correlation chart accompany index, paleogeologic, lithofacies, isopach, and lithologic maps.

McKEOWN, FRANCIS A.

1. (and Klemic, H.). [Table 5, showing] Summary of data of deposits examined in [Bucks Co.] . . . Pennsylvaina, *in* Reconnaissance for radioactive materials in northeastern United States during 1952: U. S. Geol. Survey Trace Elem. Inv. 317, p. 41-53, illus. index map, 1953. Material from near the Boyer and Durham mines is examined for radioactive-mineral content. The data are in a table. No interpretation is made; only the results are in the tables.
2. Uranium occurrences in Bucks Co., Pa. . . . *in* Reconnaissance for uranium in the United States, [Part 1] Northeastern district: U. S. Geol. Survey Trace Elem. Inv. 440, p. 167 (‡), 1954. The U percentage in the Triassic Lockatong Formation is .005 to .01, and that in the Triassic Stockton Formation is .01 to .03. Neither formation is likely to contain high-grade uranium deposits.

McLAUGHLIN, DEAN BENJAMIN, *see also* Geyer, A. R., 3; Gray, C., 7, 12; Johnson, M. E., 5; Lafayette College, 3; Willard, B., 3.

1. A suggested correlation of Triassic areas of the eastern United States: Pa. Acad. Sci. Proc., v. 24, p. 161-169, 1950. The stratigraphy of the several Triassic terranes of the eastern United States, including that of the Commonwealth, is discussed. The *Estheria*-bearing beds of each are considered to be approximately time-correlatives, reflecting a general climatic influence. This time is represented by the Lockatong Formation in Pennsylvania. The overlying red-beds are interpreted as reflecting increased stream gradients, resulting from regional uplift.
2. (and Gerhard, R. C.). Stratigraphy and origin of Triassic fluviatile sediments, Lebanon and Lancaster Counties: Pa. Acad. Sci. Proc., v. 27, p. 136-142, illus., 1953. A complete Triassic section along Hammer Creek is measured; 14,500 feet are present. Six different gross units are described petrologically and mineralogically. The sedimentation history is described. The source of the material is from the erosion of southern crystalline-rock terrane or northern sedimentary-rock terrane, and a combination of both. A geological sketch map is included.
3. Triassic basin in [southeastern] Pennsylvania and New Jersey [abs.]: Geol. Soc. America Bull., v. 64, p. 1452-1453, 1953.
4. Triassic alluvial fans in [Lancaster, Lebanon, Berks Cos.] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 68, p. 1765-1766, 1957.
5. Triassic north border near South Mountain [Lancaster, Lebanon, Berks Cos.]: Pa. Acad. Sci. Proc., v. 32, p. 151-155, illus., 1958. Detailed mapping reveals a great fault along the Paleozoic-Triassic contact; the fault is discontinuous, because in some places the Triassic rocks overlap on Paleozoic rocks. Almost no limestone conglomerate is present.
6. Mesozoic rocks, Chap. 4 *of* Willard, B., Geology and mineral resources of Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. C 9, p. 55-162, illus., with sections by E. T. Wherry, J. D. Ryan, and B. Willard, 1959. The

Triassic rocks, both igneous and sedimentary, of the county are described in considerable detail. Sections are measured; fossils are listed and illustrated.

MacMILLAN, GORDON K.

1. Shells and mastodon [Allegheny Co.]: Pa. Acad. Sci. Proc., v. 25, p. 139-141, 1951. A swamp deposit near Bridgeville has yielded mastodon remains, 7 species of water gastropods, 3 species of pelecypods, and 3 types of land snails. They are listed.

McNABB, WALLACE M., *see* Clavan, W., 1.

McNAIR, ANDREW HAMILTON

1. Upper Devonian Bryozoa: Jour. Paleontology, v. 16, p. 343-350, illus., 1942. *Sulcoretopora willardi* from the Fort Littleton Formation is described and illustrated; it is known from Lebanon and Perry Cos.

MacPHERSON, LOUIS ALBERT

1. A study of some Cambro-Ordovician oolites from central Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1952.

McWILLIAMS, GEORGE ROBERT

1. Sedimentary analyses of Conemaugh sandstones in the Pittsburgh area [Allegheny Co.]. M. S. thesis, Univ. Pittsburgh, 1955.

MABERY, CHARLES FREDERIC

1. La composition du pétrole américain: Cong. Internatl. Petrol. 1st, Paris 1900, Notes . . . : p. 59-73, Paris, 1902. Petroleum from several places in the Commonwealth is analyzed.
2. The relations of the chemical composition of petroleum to its genesis and geologic occurrence: Econ. Geology, v. 11, p. 511-527, 1916. Many examples are drawn from the Commonwealth in showing the different types of petroleum, their origin and chemistry.

MACAR, PAUL

1. Appalachian and Ardennes [Belgium] levels of erosion compared: Jour. Geology, v. 63, p. 253-267, illus., 1955. Benches, remnants of partial planation levels, are noted on the flanks of many of the mountains in eastern Pennsylvania. They are between the Schooley Peneplain and Harrisburg Surface in elevation, and are interpreted as representative of intermediate erosion surfaces.

MACAULAY, G. R.

1. Stratigraphy and paleontology of the Lower Ordovician Axemann Limestone of Kishacoquillas and Nittany Valleys, central Pennsylvania. M. S. thesis, Pa. State Coll., 1952.

MACFAYDEN, JOHN A., JR.

1. Structural geology of an area near Lehigh Gap [Carbon, Northampton Cos.], Pennsylvania. M. S. thesis, Lehigh Univ., 1950.

MACLURE, WILLIAM, 1763-1840.

1. Observations on the geology of the United States, explanatory of a geological map: Am. Phil. Soc. Trans., v. 6, p. 411-428, illus. incl. geol. map, 1809; [in French] Jour. de Physique, de Chimie, d'Hist. Nat., et des Arts, v. 69, p. 204-213, 1809; v. 72, p. 137-165, illus. incl. geol. map, Paris, 1811. A summary of the geology of the eastern United States includes that of the Commonwealth. Primitive rocks are mapped in the extreme southeastern part, Secondary rocks [Cambro-Ordovician] occur in a belt to the northwest; a belt of Transition rocks [in the Great Valley] is followed to the northwest by an uncolored zone. The western and northern parts of the state are underlain by Secondary rocks.

MANGAN, JOHN WILLIAM

1. Temperatures of natural waters in Pennsylvania. 222 p., Harrisburg, Dept. Forests and Waters, 1946. One page of tabular data is devoted to temperatures of spring water. The coldest is Beck Spring, in Somerset Co., at 46°F; several are 55°F, the warmest temperature recorded.
2. (and Van Tuyl, D. W., and White, W. F., Jr.). Water resources of the Lake Erie shore region in [Erie Co.] Pennsylvania: U. S. Geol. Survey Circ. 174, ii, 36 p., illus., 1952. The lake, streams, and subsurface are evaluated for domestic water supply potential. Ground water is not a good source, and most of the streams are small.

MANSFIELD, GEORGE ROGERS, 1875-1947.

1. (and Boardman, L.). Nitrate deposits of the United States: U. S. Geol. Survey Bull. 838, 107 p., illus., 1932. Occurrences in Tioga and Westmoreland Counties are mentioned. None is economic.

MANSFIELD, SILAS P.

1. (and Dutcher, R. R.). Petrography and mode of sulfur occurrence of a column of Pittsburgh seam coal [Washington Co.] [abs.]: Geol. Soc. America Bull., v. 69, p. 1609-1610, 1958.

MARCOU, JULES, 1824-1898.

1. Resumé explicatif d'une carte géologique des Etats Unis et des provinces anglaises de l'Amérique du Nord . . . : Soc. géol. France Bull. 2d ser., v. 12, p. 813-936, illus. incl. geol. map, Paris, 1855; Annales des Mines 5th ser., v. 7, pl. ix, Paris, 1855; review by W. P. Blake, Am. Jour. Sci. 2d ser., v. 22, p. 383-388, 1856. A map of the United States includes the Commonwealth. Blake's criticism does not deal with Pennsylvania.
2. Ueber die Geologie der Vereinigten Staaten und der englischen Provinzen von Nord-Amerika: Petermann's Mitth. aus J. Perthes' geog. Anstalt, v. 1, p. 149-159, Gotha, 1855. A generalized review of the geology of the United States includes that of the Commonwealth. No new data are included.
3. American geological classification and nomenclature. 75 p., Cambridge, Salem Press, 1888. There is nothing about Pennsylvania *per se* but constant reference is made to the errors of Pennsylvania geologists. This is a caustic, vituperative survey of the growth of the stratigraphic column.

MARK, C. G.

1. The Mercer Limestone and its associated rocks. M. A. thesis, Ohio State Univ., 1910.

MARSH, OTHNIEL CHARLES, 1831-1899.

1. List of scientific publications of Othniel Charles Marsh . . . 1861-1897. 53 p., n. p., 1882-98.

MARTIN, GEORGE CURTIS, 1875-1943, *see also* Clark, W. B., 2.

1. Geology of the Maryland coal district: Md. Geol. Survey, v. 5, p. 241-290, illus., 1905. A detailed description and discussion of the Pennsylvanian and Permian Systems in Maryland includes many references to exposures in the southwestern counties of the Commonwealth.

MARTIN, LAWRENCE

1. William Morris Davis [1850-1934], investigator, teacher, and leader in geomorphology: Assoc. Am. Geographers Annals, v. 40, p. 172-180, 1950.

MARTIN, PAUL SCHULTZ

1. Pleistocene ecology and biogeography of North America, [Chapter] 15 *in* Pt. 2 *of* Hubbs, C. L., ed., Zoogeography: Am. Assoc. Adv. Sci. Pub. 51, p. 375-420, illus., 1958. Problems of animal distribution as effected by the glacial advances are reviewed. Small-scale maps reproduce the vegetation zones in eastern North America, including those of the Commonwealth. Pennsylvania had a taiga environment during the maximum Wisconsin glaciation.
2. Taiga-tundra and the full-glacial period in Chester County, Pennsylvania: Am. Jour. Sci.. v. 256, p. 470-502, illus., 1958. Two shallow cores from a marsh are examined. The taiga-tundra flora is recognized below 70 cm. The C-14 age of this flora is 13,600 years. A pine forest zone and a deciduous forest zone are recognized above 70 cm. These findings do not support the theory of temperate forests adjacent to the Wisconsin ice in Pennsylvania.

MARTIN, WAYNE D.

1. (and Mushake, W. I.). Relationships of the Waynesburg, Hockingport, and Antiquity Sandstones of the Dunkard Basin [southwestern Pa.] [abs.]: Geol. Soc. America Bull., v. 68, p. 1896-1897, 1957.

MARTONNE, EMMANUEL DE

1. W[illiam] M[orris] Davis [1850-1934]: Annales de Géographie, v. 43, p. 326-329, Paris, 1934.
2. Douglas [Wilson] Johnson [1878-1944]: Annales de Géographie, v. 55, p. 49-52, Paris, 1946.

MATHER, KIRTLEY FLETCHER

1. Thomas Chrowder Chamberlin (1843-1928): Am. Acad. Arts and Science Proc., v. 70, p. 505-508, 1936.

2. Memorial to Wallace Walter Atwood [1872-1949]: Geol. Soc. America Proc. 1949, p. 107-112, port., 1950.

MATHEWS, EDWARD BENNETT, 1869-1944.

1. The structure of the Piedmont Plateau as shown in Maryland: Am. Jour. Sci. 4th ser., v. 17, p. 141-159, illus., 1904. The southeastern part of the Commonwealth is included. Four major rock types: banded-gneiss, thin-bedded arkosic quartzite, marble, and several mica schists are present. They are described, and tentative correlations are proposed. F. Bascom suggests correlations for use in Pennsylvania. The rocks are Precambrian-Silurian in age. Large anticlines, synclines, and faults are identified.
2. W[illiam] Bullock Clark [1860-1917], Ph.D., LL.D., State Geologist, 1896-1917: Md. Geol. Survey, v. 10, p. 31-37, port., 1918.

MATTESON, LAWRENCE STANLEY, *see* Ingham, A. I., 3.

MATTHES, FRANCOIS ÉMILE, 1874-1948, *see* Fenneman, N. M., 3.

MATTHEW, WILLIAM DILLER, 1871-1930.

1. Hypothetical outlines of the continents in Tertiary times: Am. Mus. Nat. Hist. Bull., v. 22, p. 353-383, illus., 1906. A group of small-scale world paleogeographic maps are given, one for each Tertiary epoch. The data come from mammal distribution.

MATTHEWS, LARRY

1. Bottomless Ladder Pitch Cave [Mifflin Co.]: Nittany Grotto Newsletter, v. 6, p. 19, 22 (‡), illus., 1957. A description of the discovery and exploration of this new cave includes a sketch map. It is now called "Bottomless Pitch Pit."

MAUCHER, ALBERT

1. Bailey Willis, 1857-1949: Bayerische Akad. Wiss. Jahrbuch 1951, p. 173-175, Munich, 1952.

MAXWELL, JOHN ALFRED

1. (and Rothrock, H. E.). Geology of anthracite in the western part of the Delano Quadrangle [Schuylkill Co.], Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 25, (2 sheets). Scale 1:12,000 (1 inch to 1000 feet), with sections and text, 1955. A brief text accompanies a coal outcrop map, a structure contour map of the Buck Mountain coal bed, and cross sections.

MAYNARD, THOMAS POOLE, 1883-1952, *see* Grasty, J. S., 1; Ohern, D. W., 1; Schuchert, C., 4, 6.

MAYOR, ALFRED GOLDSBOROUGH

1. Bibliographical memoir of Samuel Hubbard Scudder, 1837-1911: Natl. Acad. Sci. Mem., v. 17, p. 79-104, port., 1924.

MAZAROVICH, A. N.

1. [North America, Pt. 3 *of* Grundlagen der regionalen Geologie der Erdteile]. 347 p., illus., Moscow, Univ. Moscow Press, 1951 [in Russian] [German translation by W. Boehm, Berlin, 1958]. A review of the geology of the world includes that of North America and the Commonwealth. No new data are included.

MEADE, WILLIAM

1. Mineralogical and chemical account of the Yellow Springs, in the County of Chester, in Pa. . . . : Philadelphia Med. and Phys. Jour., suppl. 3, p. 207-216, 1809. A rough analysis of water from a spring is given. A small amount of iron is held in solution by carbonic acid. The spring's origin and potential use as a mineral water source are discussed.

MEEK, FIELDING BRADFORD, 1817-1876.

1. (and Worthen, A. H.). Descriptions of invertebrates from the Carboniferous System: Ill. Geol. Survey, v. 2, p. 145-423, illus., 1866. *Macrocheilus intercalaris* from Pennsylvanian rocks in Allegheny Co. is described and illustrated.

MEINZER, OSCAR EDWARD, 1876-1948.

1. The occurrence of ground water in the United States, with a discussion of principles: U. S. Geol. Survey Water-Supply Paper 489, 321 p., illus., 1923. Details of ground water principles are followed by generalized accounts of occurrence and distribution. Examples from the Commonwealth are included.
2. Ohio Valley well supplies subject to slow reduction of capacity: Eng. News-Record, v. 114, p. 621-622, illus., 1935. The safe yield of a multitude of small

water-systems in the Ohio drainage basin, including southwestern Pennsylvania, that draw on subsurface storage, is limited by the underground basins extent, the rate of recharge, and the permeability of the subsurface materials. Many well systems are approaching depletion from long-continued overdraft pumping.

3. Ground water in the United States; a summary: U. S. Geol. Survey Water-Supply Paper 836-D, v, p. 157-229, illus., 1939. A very generalized account of ground water conditions, reserves, and potentials includes examples from the Commonwealth.

MELCHER, ARLES FRANCIS

1. Texture of oil sands with relation to the production of oil: Am. Assoc. Petroleum Geologists Bull., v. 8, p. 716-774, illus., 1924. Extensive studies of the relationships of sandstone texture and porosity, to oil production include many examples from the Commonwealth.

MELISH, JOHN, 1771-1822.

1. Travels through the United States of America. . . . 639 p., illus., priv. pub. Philadelphia and London, G. Cowie and Co., 1818; also numerous editions. A cursory description of the geology and physiography of the Commonwealth is included

MELVIN, JOHN H.

1. Engineering geology problems of the Allegheny Plateau [Allegheny Co.] [abs.]: Geol. Soc. America Bull., v. 70, p. 1644-1645, 1959.

MENDENHALL, WALTER CURRAN, 1871-1957.

1. Memorial of Grove Karl Gilbert [1843-1918]: Geol. Soc. America Bull., v. 31, p. 26-64, port., 1920.

MERCER, HENRY CHAPMAN

1. An exploration of Durham Cave, Bucks County, Pennsylvania, in 1893, *in* Researches upon the antiquity of Man in the Delaware Valley and the eastern United States: Univ. Pa. Pubs., Ser. Phil., Lit. and Archeology, v. 6, p. 149-178, illus., 1897. Fragments of the extinct peccary *Mylohyus pennsylvanicus* are listed among the remains found in the examination of the debris from this cave. They are illustrated.

MERRIAM, CLINTON HART

1. Grove Karl Gilbert [1843-1918], the man: Sierra Club Bull., v. 10, p. 391-396, port., 1919.

MERRILL, GEORGE PERKINS, 1854-1929.

1. The first one hundred years of American geology. 773 p., illus., New Haven, Yale Univ. Press, 1924. An historical survey of geology includes many references to persons and places in the Commonwealth.

MESSINEO, ANTHONY V.

1. An insoluble residue study of the Huntsville and upper "Stones River" Limestone, south-central Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1955.

METZ, CLYDE T.

1. Nature and distribution of faunas of Upper Devonian strata of Bradford oil field [McKean Co.]. M. S. thesis, Pa. State Coll., 1952.

MEYERHOFF, HOWARD AUGUSTUS

1. Evolution of Appalachian drainage—a reinterpretation from geologic evidence [abs.]: Wash. Acad. Sci. Jour., v. 48, p. 134, 1958.

MIKAMI, H. M.

1. World iron-ore map: Econ. Geology, v. 39, p. 1-24, 1944. From a world-view, the deposit at Cornwall, Lebanon Co., is a third class deposit.

MIKLAUSEN, ANTHONY J.

1. Contributions to the fossil flora of the roof shales of the Pittsburgh coal vein of southwestern Pennsylvania. Ph.D. thesis, Univ. Pittsburgh, 1949; [abs.], Pittsburgh Univ. Bull., v. 46, no. 10, p. 54-59, 1950.

MILL, HUGH ROBERT

1. William Morris Davis [1850-1934]: Geog. Jour., v. 84, p. 93-95, London, 1934.

MILLER, ARTHUR KEITH, *see* Ulrich, E. O., 6, 7.

MILLER, BENJAMIN LEROY, 1874-1944.

1. Memorial of Edward Higginson Williams, Jr. [1849-1933]: Geol. Soc. America Proc. 1933, p. 289-298, port., 1934.
2. Practical value of economic geology in the manufacture of cement: Pit and Quarry, v. 26, no. 10, p. 29-36, 40, illus., 1934. Numerous examples from south-

eastern Pennsylvania are cited to show how the geologist can help the cement industry. Various rock deformations in quarries are described.

MILLER, JOHN TINNEY, *see also* Arndt, H. H., 1.

1. Scenery as a clue to geology [Perry Co.]: Pa. Dept. Internal Affairs Monthly Bull., v. 24, no. 3-4, p. 7-11, 24-25, illus., 1956. This is a popular account of the principles of historical geology, using examples from Perry Co.
2. The geology of the Hidden Valley Boy Scout Camp area, Perry County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. G 30, iii, 42 p., illus., 1957. A cursory, generalized review of the geology of the area is given. Silurian rocks only are described; the structure is generalized.
3. (and Conlin, R. R.). Upper Devonian rock-stratigraphic nomenclature in Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1645-1646, 1959.

MILLER, PETER

1. Description of a grotto at Swatara [Lebanon Co.?]: Am. Phil. Soc. Trans., v. 2, p. 177-178, 1786 [1783]. A delightful description of a cave "on the east side of Swatara Creek" is given.

MILLER, RALPH LEROY

1. Memorial to Armin Kohl Lobeck (1886-1958): Geol. Soc. America Proc. 1958, p. 147-155, port., 1959.

MILLETTE, J. F. GERARD

1. (and Higbee, H. W.). Morphological properties [northern Pa.] [Pt.] 1 *of* Periglacial loess: Am. Jour. Sci., v. 256, p. 284-293, illus., 1958. Loess and loess-like alluvium along the Susquehanna River from Middletown to Williamsport and Towanda are studied and compared. Large porosity plus loess-like particle-size distribution, if considered together, can distinguish loess from alluvium; these properties seldom occur concurrently in the latter. Other physical factors are discussed.

MILLS, R. VAN A.

1. (and Wells, R. C.). The evaporation and concentration of waters associated with petroleum and natural gas: U. S. Geol. Survey Bull. 693, 104 p., illus., 1919. Tables give analyses of ground waters and connate waters from many places in the Commonwealth.

MINK, JOHN F., *see* Bates, T. F., 1.

MISER, HUGH DINSMORE

1. N[elson] H[oratio] Darton, honorary member: Am. Assoc. Petroleum Geologists Bull., v. 22, p. 1118-1120, port., 1938.
2. The oil fields of the United States of America: [Pan-] Am. Sci. Cong. 8th, Washington, D. C. 1940, Proc., v. 4, p. 639-648, illus., 1942. Petroleum reserves in the Commonwealth are in the neighborhood of 200 million barrels.

MISLAY, A., *see* Risler, G., 1.

MITCHUM, ROBERT MITCHELL, JR.

1. Pottsville strata of part of the central Appalachian coal field. Ph.D. thesis, Northwestern Univ., 1954.

MOEBS, NOEL N.

1. (and Hoy, R. B.). Thrust faulting in Sinking Valley, Blair and Huntingdon Counties, Pennsylvania: Geol. Soc. America Bull., v. 70, p. 1079-1088, illus., 1959. The area is floored by Cambro-Ordovician carbonate rocks in asymmetrical anticlines, overturned to the northwest. Core information indicates an extensive thrust fault, with subsidiary branching offsets, which has displaced the northwest limb about 2 miles.

MOHR, CHARLES E.

1. (and Stone, R. W.). A selected bibliography [of Pennsylvania caves]: Natl. Speleol. Soc. Bull. 15, p. 138-139, 1953.

MONNETT, VICTOR ELVERT

1. Charles Elijah Decker (1868-1958): Am. Assoc. Petroleum Geologists Bull., v. 43, p. 263-266, port., 1959.

MONTGOMERY, ARTHUR

1. (and Bertrand, J.). Field Trip B, Mineral collecting trip to serpentine quarries north of Easton [Northampton Co.], *in* Guidebook, Field Conf. of Pa. Geologists 19th, p. 32-36 (‡), [1953]. Directions to a few famous locations, with a brief description of the geology of each, are given.

2. Pre-Cambrian rocks [southeastern Pa.], *in* Guidebook, Field Conf. of Pa. Geologists 19th, p. 19-24 (‡), [1953]. Precambrian rocks south of Easton, in the Reading Prong, are cursorily described in preparation for a field trip.

3. Uranium minerals of the Mauch Chunk area [Carbon Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 28, p. 102-110, 1954. Occurrences of carnotite, tyuyamite, and uraninite (?) from the Mt. Pisgah area, and meta-autunite, meta-uranocircite (?), and metatorbernite from Mauch Chunk ridge are described. The occurrences seem to have structural and stratigraphic control. The origin is uncertain, but seems to be hydrothermal.

4. Paragenesis of the serpentine-talc deposits near Easton [Northampton Co.], Pa.: Pa. Acad. Sci. Proc., v. 29, p. 203-215, illus., 1955. The regional geology and mineralogy are summarized. Three primary factors control the serpentine-talc deposits; they are: (1) granite-pegmatite intrudes siliceous-shaly dolomites; (2) the differing chemical compositions of these beds and their highly selective chemical control during contact metamorphism; and (3) often-renewed deformation associated with the magmatic intrusions which bring in rare-element-bearing hydrothermal solutions.

5. Thermal metamorphism of redbeds by diabase at Ringing Rocks, near Kintnersville [Bucks Co.], Pa.: Pa. Acad. Sci. Proc., v. 30, p. 176-181, illus., 1956. A nearly 200 foot thick zone of thermally metamorphosed Triassic Brunswick Formation shale is described. Diabase intrusions have created various kinds of hornfels from the various kinds of shales. The hornfels types can be correlated stratigraphically with the shale types.

6. Three occurrences of high-thorian uraninite near Easton [Northampton Co.], Pennsylvania: Am. Mineralogist, v. 42, p. 804-820, illus., 1957. At a quarry, Frandel's mineral C, thorogummite, and then boltwoodite and uranophane were formed in sequence from uraninite during serpentinization. Supergene coatings occurred later. Elsewhere, a slight alteration of uraninite to thorogummite occurred. At another quarry uraninite is found unaltered. Thorium-rich Easton uraninite does not alter readily to secondary minerals except under severe serpentinization and hydrothermal action.

MONTGOMERY, MORTON L.

1. Crystal Cave [Berks Co.]: Historical and Biog. Annals of Berks County, Pennsylvania. . . . v. 2, p. 821-822, illus., Chicago, J. H. Beers and Co., 1909. An account of the discovery and an early description of the cave is given.

MOODIE, ROY LEE, 1880-1934.

1. A contribution to a monograph of the extinct Amphibia of North America. New forms from the Carboniferous: Jour. Geology, v. 17, p. 38-82, illus., 1909. *Tuditanus minimus* and *T. sculptilis* from the Pennsylvanian shale at Cannelton, Beaver Co., are described and illustrated.

2. Carboniferous air-breathing vertebrates of the United States National Museum: U. S. Natl. Mus. Proc., v. 37, p. 11-28, illus., 1909. *Erpetosaurus minutus,* an amphibian, from Pennsylvanian rocks at Cannelton, Beaver Co., is described and illustrated. *Tuditanus minimus* from the same location is illustrated.

MOORE, EDWARD JAMES, *see* Gross, G. W., 2.

MOORE, ELWOOD S.

1. Why coal has cleat and the way in which it runs: Coal Age, v. 27, p. 576-578, illus., 1925. Cleat, or joints, in coal is analyzed. Examples from western Pennsylvania and elsewhere are used to show that it is *not* due to tidal stresses, as had been earlier suggested.

2. Memorial to Heinrich Ries [1871-1951]: Geol. Soc. America Proc. 1951, p. 141-144, port., 1952.

MOORE, RAYMOND CECIL, *see also* Chamberlin, T. C., 7.

1. Carboniferous-Permian boundary [southwestern Pa.]: Am. Assoc. Petroleum Geologists Bull., v. 24, p. 282-336, illus., 1940. A review of this boundary problem on a world-wide scale includes southwestern Pennsylvania. No new data are included for the Commonwealth.

MOORE, SHERMAN

1. Crustal movement in the Great Lakes area [northwestern Pa.]: Geol. Soc. America Bull., v. 59, p. 699-709, illus. incl. map, 1948. The entire area is

subsiding with respect to sea level. The methods employed and the results obtained are discussed, but no conclusion as to the cause of the movement is reached. A map shows the results; one measuring station is in Erie Co.

MORAN, H. E., *see also* Fieldner, A. C., 5; Harr, L., 1; Kirgis, F. L., 1.

MORAN, WILLIAM E.

1. Location and stratigraphy of known occurrences of fossil tetrapods in the Upper Pennsylvanian and Permian of Pennsylvania, West Virginia, and Ohio, *in* Fossil vertebrates of the Tri-State area: Carnegie Mus. Annals, v. 33, p. 1-44, illus., 1952. Vertebrate-fossil collecting locations from Cannelton, Beaver Co.; from Pitcairn, Montrose, and Pittsburgh, Allegheny Co.; from Springhill, and Rickhill Twps., Greene Co.; and from East and West Finley Twps., Washington Co. are described. Sections are measured.

MORISAWA, MARIE E.

1. Relation of quantitative geomorphology to stream flow in representative watersheds of the Appalachian Plateau Province. Columbia Univ. Dept. Geology Tech. Rept. 20, ix, 94 p., illus., 1959. Green Lick Run, in Fayette Co., Little Mahoning River, in Indiana Co., and Allegheny River, in McKean and Potter Cos., are used as examples, along with other streams elsewhere, to demonstrate the relationship of geometry to horizontal stream drainage composition. Vertical, or relief properties, do not conform. Rigorous statistical analyses are involved.

MOSELEY, JOHN REED, 1900-1959, *see also* Geyer, A. R., 3; Gray, C., 7.

1. Ordovician-Silurian contact in east Pennsylvania. Ph.D. thesis, Harvard Univ., 1949.
2. The Ordovician-Silurian contact near Kempton [Berks Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 24, p. 176-187, illus., 1950. The Martinsburg Formation has a lower shaly member and an upper sandy member. The Tuscarora Formation lies on both members, thus demonstrating the presence of an angular unconformity.
3. Limestones within the belt of the Martinsburg Group in Lebanon County, Pennsylvania: Pa. Acad. Sci. Proc., v. 26, p. 78-85, illus., 1952. Four distinct limestone types are recognizable; they are: (1) argillaceous limestone with interbedded shale, (2) bedded, dense, dark limestone, (3) arenaceous limestone, and (4) intraformational conglomerate. The distribution of each, structural features, and stratigraphy are discussed. They are in local, lens-shaped masses.
4. Cross faults in the Martinsburg Formation, Lebanon County, Pennsylvania: Pa. Acad. Sci. Proc., v. 28, p. 135-142, illus., 1954. Cross faults, identified by the offsetting of key ridge-forming units, are described from near Bunker Hills, Fredericksburg, and other locations. Small sketch maps are included. The age of the faulting is uncertain.
5. Trip 3, Martinsburg Formation and associated eruptive rocks of the Jonestown area [Lebanon Co.] *in* Field Conf. of Pa. Geologists 20th, Hershey 1954, p. 31-44 (‡), illus., [Harrisburg, Pa. Geol. Survey] [1954]. This is a detailed road-log itinerary which discusses the Martinsburg Formation and diabase sills and lava flows. Limestone and shale exposures are described. Intrusive diabase sills, amygdaloidal lava, sandstone, and contact-metamorphosed zones are visited. Sections are measured.
6. Basic igneous rocks in the Martinsburg Formation in Lebanon County, Pennsylvania: Pa. Acad. Sci. Proc., v. 30, p. 186-190, illus., 1956. Volcanic and plutonic rocks occur. There are several basalt flows with intercalated tuffs. The basalts are sufficiently different to indicate two distinct series of flows. The intrusive rocks are diorites which are partly concordant and partly discordant.

MOSER, ERWIN LEROY, JR.

1. A porosity study of the Allentown Dolomite near Bethlehem [Northampton Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1952.

MOSS, JOHN HALL, *see* Bricker, O. P., Jr., 1.

MOSS, RYCROFT GLEASON

1. Buried pre-Cambrian surface in the United States: Geol. Soc. America Bull., v. 47, p. 935-966, illus., 1936. Contour maps on the Precambrian surface in

the United States include that of the Commonwealth. The Pittsburgh-Huntingdon Basin and Nittany Arch are clearly shown. The Precambrian surface is over 20,000 feet deep in the basin and less than 1000 feet deep at the arch.

MOXON, CHARLES

1. On the geology of the United States: Geologist 1843, p. 56-64. illus., London, 1843. An extremely cursory review of the geology of the United States includes that of the Commonwealth. A small-scale map is used. Transition and Secondary rocks only are identified in the Commonwealth. What is now called Triassic is mapped as Old Red Sandstone [Devonian].

MOYD, PAULINE D. AUERBACH, *see* Auerbach, Pauline D.

MURPHY, ALLEN EMERSON

1. Lithofacies investigations of the Middle and Upper Devonian rocks of the Allegheny Synclinorium (Appalachian Basin) [western Pa.] [abs.]: Dissert. Abs., v. 15, p. 2515, 1955.

MURPHY, LEONARD M.

1. (and Cloud, W. K.). United States earthquakes 1951: U. S. Coast and Geod. Survey Ser. 762, 50 p., illus., 1953. The earthquake of Nov. 23, 1951, in Allentown, Lehigh Co., is described. Little damage was done. No intensity data are given; it was light, however.
2. (and Cloud, W. K.). United States earthquakes 1954: U. S. Coast and Geod. Survey Ser. 793, vi, 110 p., illus., 1956. The earthquakes at Sinking Springs, Berks Co., on Jan. 7, 23, Aug. 10, and Sept. 24, 1954 are described. One had an intensity of VI. Wilkes-Barre, in Luzerne Co., had 2 earthquakes, one on Feb. 21 and another on Feb. 23. One was intensity VII. Each is described.
3. (and Cloud. W. K.). United States earthquakes 1955. 83 p., illus., U. S. Coast and Geod. Survey, 1957. The earthquake in Berks Co., on Jan. 19, 1955, of intensity IV, is described. It was felt from West Reading to Wernersville and from West Leesport to Gouglersville.

MURPHY, RAYMOND E.

1. (and Spittal, H. E.). A new production map of the Appalachian bituminous coal region: Assoc. Am. Geographers Annals, v. 34, p. 164-172, illus., 1944. Maps of the Appalachian area, including southwestern Pennsylvania, show the intensity of coal production.

MURRAY, DAVID

1. [Petroleum in Venango Co.] [abs.]: Albany Inst. Trans., v. 4, p. 289, 1861; discussion by J. Hall, p. 289, 1861.
2. Petroleum, its history and properties: Albany Inst. Trans., v. 4, p. 149-166, 1864. An historical review includes much information about the Commonwealth.

MUSHAKE, WILLIAM I, *see* Martin, W. D. 1.

MYERS, RICHMOND ELMORE

1. Vacationing with a purpose in [eastern] Pennsylvania: Earth Science Digest, v. 1, no. 8, p. 11-13, 22-23, 25-26, 40, 1947. This is a popular account of some of the famous mineral-collecting locations in the Commonwealth.
2. The Conewango potholes of the Susquehanna River [Lancaster Co.]: Pennsylvania Angler, v. 22, no. 10, p. 6-9, 25-27, illus., 1953. A popular, abundantly illustrated account of the potholes in the diabase in the river is given.
3. The geology of Bradford County, Pennsylvania: Rocks and Minerals, v. 29, p. 144-146, 178, illus., 1954. A popular account of the geological history and topography is given.
4. Middle-Atlantic geographic corridors: Sci. Monthly, v. 80, p. 310-319, illus., 1955. This is a popular account of the effects of topography on the development of the Commonwealth.
5. Some trap rock geography [southeastern Pa.]: Pa. Acad. Sci. Proc., v. 31, p. 86-90, 1957. A description of the geographic, topographic, geologic, and economic effects of the Triassic diabase terrain includes no new data.

MYERS, THURMAN H.

1. Deep-sand [oil and gas] developments in Appalachian region during 1939: Am. Assoc. Petroleum Geologists Bull., v. 24, p. 970-973, illus., 1940. A review of the year's activity includes that of the Commonwealth.

NADEAU, BETTY KELLETT, *see* Kellett, Betty.

NATIONAL RESEARCH COUNCIL, COMMITTEE FOR THE STUDY OF EOLIAN DEPOSITS

1. [Map of] Pleistocene eolian deposits of the United States, Alaska, and parts of Canada, (2 sheets). Scale 1:2,500,000 (about 1 inch to 40 miles), New York, Geol. Soc. America, 1952.

NAVIAS, LOUIS

1. (and Davey, W. P.). Differentiation between mullite and sillimanite by their x-ray diffraction patterns: Am. Ceramic Soc. Jour., v. 8, p. 640-647, illus., 1925. A sample of sillimanite from Delaware Co. is used in an x-ray technique demonstration. Illustrations of its diffraction pattern are included.

NEEDHAM, B.

1. Report of the Tunungwant coal field, McKean County, Pa. 54 p., [n. p.] [n. d. ? 1857]. A report designed to go with a prospectus discusses the occurrences of coal, iron, limestone, and fire clay.

NELSON, BENJAMIN N., *see also* Dunn, J. R., 4.

1. Ken's Cave [Westmoreland Co.]: Netherworld News, Oct. 1955, p. [13-14 (‡)], illus., 1955. The cave is briefly described; a sketch map is included.

NELSON, C. S., *see* Vacquier, V., 1.

NELSON, JOHN MARSHALL

1. (and Brill, K. G., Jr.). Radioactivity of asphalitites, coals, and shales in . . . Pennsylvania: U. S. Geol. Survey Trace Elem Inv. 43, 22 p. (‡), illus.. 1948. Anthracite and bituminous coal samples are measured for their U content. None are considered economical uranium sources.

NEUMAN, ROBERT BALLIN

1. St. Paul Group—a revision of the "Stones River" Group of Maryland and adjacent states [Franklin Co.]: Geol. Soc. America Bull., v. 62, p. 267-324, illus. incl. geol. map, 1951. Detailed descriptions, paleontology, and stratigraphic discussions of this Middle Ordovician group of rocks includes those from portions of the Commonwealth. Sections are measured; fossils are described and illustrated.

NEW YORK AND SCHUYLKILL COAL COMPANY

1. Description of the coal lands of . . . Schuylkill County, Pennsylvania. 19 p., illus., New York, W. A. Mercein, 1832. A sale prospectus includes brief descriptions of anthracite coal. Very little geological information is given.

NEWBERRY, JOHN STRONG, 1822-1892.

1. Descriptions of fossil fishes: Ohio Geol. Survey Rept., v. 1, pt. 2, Paleontology, p. 247-355, illus., 1873. *Ctenocanthus triangularis* from Mississippian rocks in Venango Co. is described and illustrated.
2. Descriptions of fossil fishes: Ohio Geol. Survey Rept., v. 2, pt. 2, Paleontology, p. 1-64, illus., 1875. *Ctenoptychius semicircularis* from Mississippian rocks in Allegheny Co., *Dipterus sherwoodi* from Devonian rocks in Tioga Co., and *Heliodus lesleyi* from Devonian rocks in "northern Pennsylvania", are described and illustrated.
3. North America in the Ice Period: Pop. Sci. Monthly, v. 30, p. 1-10, illus., 1886. An extremely generalized, popular account of North American glaciation includes that in the Commonwealth.
4. The Paleozoic fishes of North America: U. S. Geol. Survey Mon. 16, 340 p., illus., 1889; correction by O. P. Hay with title, On some changes in the names, generic and specific, of certain fossil fishes: Am. Naturalist, v. 33, p. 783-792, 1900. Silurian to Permian aged fish are described; many are from the Commonwealth. Hay changes *Cladodus carinatus* to *C. coniger*.

NICKELSEN, RICHARD P., *see also* Lattman, L. H., 1; Williams, E. G., 2.

1. (and Williams, E. G.). Structure and stratigraphy of Pennsylvanian sediments of the Plateau area near Philipsburg and Clearfield [Clearfield Co.], Pennsylvania, *in* Field Conf. of Pa. Geologists 21st, p. Sd 1-Sd 41 (‡), illus. [1955]. A detailed description of Pennsylvanian rocks is followed by a road log of a field trip with descriptions of each stop. Sedimentary features and jointings are described and discussed. Numerous fence diagrams are also included.

2. Cross-bedding in Pennsylvanian sandstones of [Centre, Clearfield Cos.] central Pennsylvania—a preliminary study: Geol. Soc. America Bull., v. 69, p. 791-796, illus., 1958. Information on the type and dip direction of Pennsylvanian cross bedding is presented. The data indicate an eastern or southeastern source for the Upper Pottsville and Allegheny sediments in central Pennsylvania.
3. (and Hough, VanN. D.). Regional orientation of joints in the Appalachian Plateau of [western] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 69, p. 1624, 1958.
4. (and Gross, G. W.). Petrofabric study of Conestoga Limestone from Hanover [York Co.], Pennsylvania: Am. Jour. Sci., v. 257, p. 276-286, illus., 1959. Prominent features in this low-grade metamorphic, sandy textured carbonate rock are: (1) overall monoclinic symmetry, (2) post-crystalline late phase orthorhombic symmetry, and (3) ac girdles perpendicular to megascopic fold axes. The fabric results from differently oriented episodes of orthorhombic movement of the axes which rotated through the rock during deformation. Compression axes causing late phase deformation are in the ac plane in zones approximately bisected by the normal slaty cleavage. Petrofabric diagrams are included.

NOECKER, MAX

1. (and Greenman, D. W., and Beamer, N. H.). Water resources of the Pittsburgh area [Allegheny Co.], Pennsylvania: U. S. Geol. Survey Circ. 315, iv, 56 p., illus., 1954. Surface water and ground water sources are described. Ground water is important because river water has mine-drainage in it. Valley-fill deposits are important reservoirs; a map is included.

NORMANDIE, JOHN DE

1. An analysis of the chalybeate waters of Bristol, in [Bucks Co.] Pennsylvania . . . : Am. Phil. Soc. Trans., v. 1, p. 368-379, [1768]; 1789, [2d edition, corrected]. Spring water is analyzed for its medical properties.

NORTH AMERICAN COAL COMPANY

1. Brief sketch of the property belonging to the North American Coal Company with some general remarks on the subject of coal and coal mines. 23 p., illus., New York, George F. Hopkins, 1827. This is a prospectus. Coal beds near Mount Carbon, Schuylkill Co., are described; there are at least 6 beds known. Little geology is included.

NORTHWESTERN PENNSYLVANIA OIL AND COAL COMPANY

1. Reports by P. W. Sheafer, Dr. Charles T. Jackson, and William F. Roberts [Elk Co.]. 36 p., illus., [n. p.] 1865. These are reports to accompany a prospectus. Apologies are made for the lack of oil discussion in some of the reports, as they were prepared prior to the discovery of oil. Analyses of the coal are included. Iron ore is also reported.

NORTON, DORITA ANNE

1. A mineralogical and geochemical study of clinopyroxenes from southeastern Pennsylvania and Delaware. Ph.D. thesis. Bryn Mawr Coll., 1958.
2. (and Clavan, W. S.). Metamorphosed clinopyroxenes from the [southeastern] Pennsylvania and Delaware Piedmont Province [abs.]: Geol. Soc. America Bull., v. 69, p. 1624, 1958.
3. (and Clavan, W. S.). The optical mineralogy, chemistry, and x-ray crystallography of ten clinopyroxenes from the [Chester Co.] Pennsylvania and Delaware Piedmont Province: Am. Mineralogist, v. 44, p. 844-874, illus., 1959. Theoretical considerations and the presence of persistent unidentified reflections on diffractometer curves suggest that chemically complex clinopyroxenes are substructurally different from diopside. The samples are of igneous origin. Subsequent metamorphism has changed them.

NORWOOD, EDWARD M., JR.

1. Geology of the Evitts Creek 7½ minute topographic quadrangle [Bedford Co.]. M. S. thesis, Univ. West Va., 1957.

NUSSBAUM, FRITZ

1. Erinnerungen an Professor W[illiam] M[orris] Davis [1850-1934]: Schweizer Geograph. Jahr 11, no. 5, p. 105-115, illus., Bern, 1934.

O'BRIEN, GERALD D.

1. Metadiabase in South Mountain, Northampton County, Pennsylvania: Pa. Acad. Sci. Proc., v. 27, p. 154-158, illus., 1953. Hydrothermally-altered diabase, not in place, is described petrographically and stratigraphically. This, and others from elsewhere, may be late Precambrian to pre-Triassic in age, with some evidence pointing toward an Ordovician age. Photomicrographs are included.
2. (and Randolph, J. R.). The use of soil and water studies in structural interpretation of Oley Valley [Berks Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 28, p. 111-119, illus., 1954. Simple microscopic examination of soil-minerals and rock-fragments often indicates the character of the bedrock. Also, abrupt changes in pH or hardness in well or spring water often show formation contacts. Examples are given.

O'CONNELL, MARJORIE

1. The habitat of the Eurypterida: Buffalo Soc. Nat. Sci. Bull., v. 11, no. 3, 277 p., illus., 1916. A detailed review of the group includes environmental descriptions and evaluations of *Dolichopteris otisius* from the Silurian of Monroe Co., *Eurypterus approximatus* from the Mississippian of Warren Co., *E. maria* from Silurian rocks of Monroe and Lebanon Cos., *E. mansfieldi* from Pennsylvanian rocks of Beaver Co., *E. pennsylvanicus* from Pennsylvanian rocks of Venango Co., *Hughmilleria shawangunk* from Silurian rocks of Monroe Co., *H. socialis* from Silurian rocks of Lebanon and Fulton Cos., *Pteryogotus globiceps* from Silurian rocks of Lebanon and Monroe Cos., *Stylonurus beecheri* from Mississippian rocks of Warren Co., and *S. myops* from Silurian rocks of Monroe Co. They are shown to be terrestrial organisms.

O'DONNELL, HUGH JOHN, *see* Parks, B. C., 1.

OGILVIE, G. J., *see* Brindley, G. W., 1.

OHERN, DANIEL WEBSTER, 1870-1953.

1. (and Maynard, T. P.). Mollusca, *in* Systematic paleontology of the Lower Devonian deposits of Maryland: Md. Geol. Survey, Lower Devonian, p. 450-489, illus., 1913. Many clams and snails from Devonian rocks in Bedford Co. are described and illustrated.

OIL AND GAS JOURNAL

1. Correlator—midcontinent to Appalachian: Oil and Gas Jour., v. 57, no. 13, p. 148, 1959. A time-rock chart shows the relationship of the oil-bearing rocks in the Commonwealth to those of other areas.

OKULITCH, VLADIMIR JOSEPH

1. Tetradidae; a revision of the genus *Tetradium:* Roy. Soc. Canada Trans. 3d ser., v. 29, sec. 4, p. 49-74, illus., 1935. *Tetradium syringoporoides* is typical of the Stones River [Formation] of Pennsylvania; it is described and illustrated.

OLDACH, FREDERICK MAIER

1. Sulfide mineralization and its development at Falls of French Creek Mines, Chester County, Pennsylvania. Ph.D. thesis, Univ. Pa., 1929.

OLSON, R. C., JR., *see* Van Houten, F. B., 1.

O'NEILL, BERNARD J., JR.

1. Geology of the anorthosite massif in Chester County, Pennsylvania. M. S. thesis, Calif. Tech. Inst., 1952.

ORCHIN, MILTON, *see* Feldman, J., 1.

OWEN, DAVID DALE, 1807-1860

1. Geological report on the coal and iron lands of D. Kingsbury and others in McKean County, Pennsylvania. 29 p., illus., [n. p.] [n. d. ?1857]. A report designed for a prospectus describes the occurrence of coal and iron. Many analyses are included.

OZOE, MICHEAL A.

1. A petrographic study of lower Allegheny and upper Pottsville sandstones in southern Somerset County, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1958.

PACKARD, ALPHEUS SPRING, JR., 1831-1905.

1. The geological succession of Phyllopoda; U. S. Geol. Geog. Survey Terr. (Hayden) Ann. Rept., v. 12, pt. 1, p. 355-362, illus., 1883. *Estheria ovata* and *Leaia leidyii* from Pennsylvanian black shale in Luzerne Co. are described. The latter is illustrated.

PAGE, L. R., *see* Kaiser, E. P., 1.

PALACAS. JAMES G.

1. Lithocharacters and stratigraphy of the upper New Market, Row Park, and lower Beekmantown beds in the vicinity of Greencastle [Franklin Co.], Pennsylvania. M. S. thesis, Pa. State Univ., 1957.

PALACHE, CHARLES, *see also* Frondel, C., 1.

1. Edward Salisbury Dana (1849-1935): Am. Acad. Arts and Science Proc., v. 70, p. 517-518, 1936.

PANTAZOPLES. GUS, *see* Feldman, J., 1.

PARÉJAS, EDOUARD

1. Essai sur la structure transversale des États Unis: Vereinig. Schweizer Petroleum-Geologen u. Ing. Bull., v. 16, no. 50, p. 1-30, illus., Basel, 1949. Great structural trends of the United States are outlined on a map. Many are in the Commonwealth. Pennsylvania is crossed, from southeast to northwest, and across the southwestern corner, by the Transverse, Michigan-Pennsylvania Depressed Complex; from north to south by the Appalachian Geosyncline axis; and to the east of this, by the Appalachian Front. These, and other major features in the country, are discussed.

PARKER, EDWARD WHEELER

1. (and Holmes, J. A., and Campbell, M. R.). Report on the operations of the coal-testing plant of the U. S. Geological Survey . . . : U. S. Geol Survey Prof. Paper 48, 1475 p., illus., 1906. Descriptions of various coals from Somerset and Lackawanna Cos. are included. Analyses are included for various coals throughout the Commonwealth.

PARKER, G. H.

1. William Healy Dall (1845-1927): Am. Acad. Arts and Science Proc., v. 62, p. 251-253, 1928.

PARKER, JOHN DYAS

1. Exploring an underground river [Mifflin Co.]: Natl. Speleol. Soc. Bull. 12, p. 80-84, 1950. This is a popular account of the underground water courses in Aitken Cave.
2. Bone caves in Pennsylvania: Natl. Speleol. Soc. Bull. 15, p. 10-14, illus., 1953. A popular account of how bones get into caves includes descriptions of the Port Kennedy Cave in Montgomery Co., the Frankstown Cave in Blair Co., and others.

PARKS, BRYAN CONRAD

1. (and O'Donnell, H. J.). Petrography of American coals: U. S. Bur. Mines Bull. 550, viii, 193 p., illus., 1956. Extremely detailed petrographic analyses of many coals from the Commonwealth are discussed. Many analyses are made.

PARRISH, WILLIAM

1. Memorial of Samuel George Gordon [1897-1952]: Am. Mineralogist, v. 38, p. 301-308, port., 1953.

PATRICK, A. L.

1. Soil erosion in Pennsylvania, *in* Preliminary report . . . to the National Resources Board, p. 97-102, illus., Harrisburg, Pa. State Planning Bd., 1934. Examples of soil erosion from many parts of the Commonwealth are cited. Sheet erosion, as opposed to gully erosion, is the more predominant type.

PATTERSON, ELMER DAVISSON

1. Radioactivity of part of the bituminous coal region of [western] Pennsylvania: U. S. Geol. Survey Trace Elem. Inv. 479, 44 p. (‡), illus., 1954. Samples of coal from over 100 locations indicate that in only one place, Clearfield Co., is the coal non-radioactive. The Lower Freeport coal at one place contains .019% uranium. The results are in tables.

PAYNE, FRANKLIN RUSSELL, JR.

1. A gamma ray log study of the Mississippian sands in the Elders Ridge Quadrangle, Armstrong and Indiana Counties, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1958.

PEALE, ALBERT CHARLES, 1849-1914.

1. Natural mineral waters of the United States: U. S. Geol. Survey Ann. Rept., v. 14, pt. 2, p. 51-88, 1894. A review of mineral springs and their sources is given. Many from the Commonwealth are listed.

PEARRE, NANCY C., *see also* Glass, J. J., 1.

1. Corundum mining in the Piedmont Province of [southeastern] Pennsylvania: [Pa. Geol. Survey 4th ser.] Inf. Circ. 13, ii, 11 p., illus., 1958. Corundum occurs in commercial quantities only in Chester and Delaware Cos. It occurs in sodium-rich pegmatites closely associated with serpentine rocks. A review of occurrences and production is included. Small sketch maps show the locations in Chester and Delaware Cos.
2. (and Heyl, A. V., Jr.). The history of chromite mining in Pennsylvania and Maryland: Pa. Geol. Survey 4th ser., Inf. Circ. 14, ii, 23 p., illus., 1959. An historical account includes a general review of the geological occurrences of chromite, maps, and other data. Most of the chromite is in Lancaster and Chester Cos.

PEELE, ROBERT

1. James Furman Kemp [1859-1926]: Eng. Min. Jour., v. 122, p. 872, port., 1926.

PELLETIER, BERNARD RODERICK

1. Pocono paleocurrents in Pennsylvania and Maryland: Geol. Soc. America Bull., v. 69, p. 1033-1063, illus., 1958. Lithofacies and isopach maps, cross bedding, sedimentation studies, and paleontologic criteria are evaluated for paleocurrent direction determination. The Pocono Formation (Mississippian) has a fluviatile origin and the sediments were derived from clastic sedimentary and low rank metamorphic rocks from the southeast.

PELTIER, LOUIS COOK

1. Pleistocene terraces of the Susquehanna River, Pennsylvania. Ph.D. thesis, Harvard Univ., 1948.
2. The geographic cycle in periglacial regions as it is related to climatic geomorphology: Assoc. Am. Geographers Annals, v. 40, p. 214-236, illus., 1950. Examples of periglacial frost action from near Catawissa are used to demonstrate a periglacial geomorphic cycle. The elevation of the ridges is lowered, and the ridge slopes become less steep and smoother because of accumulating debris.
3. Late Pleistocene deposits, Chap. 5 *of* Willard, B., Geology and mineral resources of Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. C 9, p. 163-184, illus., 1959. No till is present in the county, but the river valleys have considerable glacial debris in them. Outwash, valley fill, and terraces in the Delaware River drainage basin are described in detail. Periglacial features are mentioned.

PENCK, ALBRECHT

1. Grove Karl Gilbert [1843-1918]: Gesell. Erdk. Berlin Zeitschr. 1929, p. 265-278, 1929.

PENFIELD, SAMUEL LEWIS, 1856-1906.

1. (and Sperry, E. S.). Barium feldspar from Blue Hill, Delaware Co., Pa.; the *cassinite* of Dr. I. Lea, [Part] 7 *of* Mineralogical notes: Am. Jour. Sci. 3d ser., v. 36, p. 326-329, 1888. The cassinite reported by I. Lea (Bull. G-34, p. 134, no. 14) is examined optically and chemically. The mineral is regarded as a mixture of 35.23 percent albite, 51.15 percent orthoclase, and 13.17 percent hyalophane.

PENNSYLVANIA GEOLOGICAL SURVEY [4TH]

1. [Map showing] Reconnaissance data on geologic structures in southern Cameron County, Pennsylvania: Pa. Geol. Survey 4th ser., Inv. Circ. 1, 1951. The map outlines the axes of anticlines and synclines and shows the name of the features.
2. [Map of] Oil and gas fields of Pennsylvania. Scale, 1 inch to about 7 miles, Pa. Geol. Survey, 1953.

PEPPER, JAMES FRANKLIN

1. (and de Witt, W., Jr., and Demarest, D. F.). Geology of the Bedford Shale and Berea Sandstone in the Appalachian Basin [western Pa.]: U. S. Geol. Survey Prof. Paper 259, vi, 111 p., illus. incl. geol. maps, 1954; summary,

Science, v. 119, p. 512-513, 1954. Maps and cross sections show the variations in thickness, lithology, and stratigraphy of these two formations. The Bedford Shale is deltaic, and the Berea Sandstone overlies it, at first subaerially as a delta and later as a marine pavement that formed as the sea inundated the delta. The relations of the Corry and Cussewago Sandstones in the Commonwealth are discussed. Paleogeography is discussed.

PERCIVAL, STEPHEN F.

1. Brachiopods, mollusks, and tentaculitids from the Lower Devonian Shriver Chert of central Pennsylvania. M. S. thesis, Pa. State Univ., 1959.

PERRY, STUART HOFFMAN, *see* Henderson, E. P., 2.

PHILBRICK, SHAILER SHAW, *see also* Ferguson, H. F., 1.

1. Geology of the Crooked Creek dam site [Allegheny Co.], Pennsylvania [abs.]: Econ. Geology, v. 32, p. 1073-1074, 1937.
2. Design of deep rock cuts in the Conemaugh Formation, *in* Symposium on geology as applied to highway engineering 4th, p. 79-88, Charlestown, W. Va., Morris Harvey Coll., W. Va. Road Comm., 1953. Problems and solutions associated with the 300-foot cut required on the Youghiogheny Dam spillway, in Fayette Co., are described; the problems of the deep railroad cut along the Pennsylvania Railroad at East Bow, Westmoreland Co., is also described. Both are in the Conemaugh Formation, and in a variety of rock types.
3. Engineering geology of the Pittsburgh area [Allegheny, Beaver Cos.], *in* Geol. Soc. America Guidebook for field trips . . . , p. 191-203, illus., Pittsburgh Geol. Soc., 1959. Trips are taken to various types of structures illustrating the effects of local geologic (mostly cyclical) phenomena on foundation design. A detailed road log is included.

PILSBRY, HENRY AUGUSTUS, 1862-1957.

1. William Healy Dall [1845-1927]: Nautilus, v. 41, p. 1-6, 1927.

PITTELKOW, JOHANN

1. Die eiszeitliche Trockengrenze Nordamerikas: Geog. Zeitschr. Jahrg. 42, p. 201-212, illus., Leipzig, 1936. [not seen]

PITTSBURGH GEOLOGICAL SOCIETY

1. Field guidebook of Appalachian geology, Pittsburgh to New York, American Association of Petroleum Geologists Field Trip, March 26-27, 1955. 119 p., illus. incl. geol. maps, New York, 1955. Contains numerous papers which are cited individually.

PLATT, FRANKLIN, 1844-1900.

1. (and Platt, W. G.). Report of progress in the Cambria and Somerset district of the bituminous coal-fields of western Pennsylvania—Part 1, Cambria [County]: Pa. Geol. Survey 2d, Bull. H H, xxx, 194 p., illus. incl. geol. maps, 1877. A description of the [Pennsylvanian] rocks and coal is given. Certain special structures are also described. Sections are measured and correlated; analyses are made. Coal, iron, limestone, and natural gas are the chief economic products.
2. [The geology of] Sullivan County: Pa. Geol. Survey 2d, Bull. G G, p. 161-247, illus. incl. geol. map, 1880. A complete geologic description of the area is given. [Devonian-Pennsylvanian] rocks are present. Anticlines and synclines make up the structure. Much emphasis is placed on the coal, which is the chief economic resource. Sections are measured.

PLATT, ROBERT BAXTER

1. An ecological study of the mid-Appalachian shale barrens and of the plants endemic to them: Ecol. Monographs, v. 21, p. 269-300, illus., 1951. The Devonian Brailler Shale in Bedford Co. and elsewhere in the Appalachians is characterized by special plant features. The chemistry and physical nature of the shale is one of the prime factors in the plant control.

PLATT, WILLIAM GREENOUGH, *see* Platt, F., 1.

PLOTTS, WILLIAM

1. Isogeotherm, or monist, theory of stratified mineral occurrence and origin. 55 p., illus., privately printed, Olinda, Shasta County, Calif., 1940. Mineral deposits occur in selected layers in the earth, as a result of temperature and pressure gradients, regardless of stratigraphy and structure. Coal layers are at the top; these are underlain by red beds; salt and brine are below these,

and petroleum and gas are at the bottom. Examples are taken from the Commonwealth. Discussions at the end, including published correspondence, are riotous.

PLUMB, H. S.

1. Colton's map of the oil district of Pennsylvania comprising part of the counties of Crawford, Venango, and Warren. Scale, 1 inch to 240 rods, New York, J. H. Colton, 1865.

POPE, GEORGE S.

1. Analyses of coals purchased by the government during the fiscal years 1908-1915: U. S. Bur. Mines Bull. 119, 118 p., 1910. Proximate and ultimate analyses of many bituminous coal samples from western Pennsylvania are included.
2. Government coal purchases under specifications with analyses for the fiscal year 1909-10: U. S. Bur. Mines Bull. 41, 96 p., illus., 1912. Coal from many places in the Commonwealth and delivered to many different agencies have proximate and ultimate analyses tabulated.

PORTER, HORACE C.

1. (and Fieldner, A. C.). Weathering of the Pittsburgh coal bed at the experimental mine near Bruceton [Allegheny Co.], Pa.: U. S. Bur. Mines Tech. Paper 35, 35 p., illus., 1914. Analyses of the Pittsburgh bed along a drift into a hillside, starting from the outcrop, are given. The amount of weathering is shown. Weathering has effected the coal for a distance into the ground not greater than 50 feet. The carbon and hydrogen content decrease, and the oxygen content increases with weathering time. The caloric value of the coal is discussed.

POSTEL, ALBERT WILLIAMS

1. Hydrothermal emplacement of granodiorite near Philadelphia [Philadelphia Co.]. Ph.D. thesis, Univ. Pa., 1939.
2. Problems of the pre-Cambrian in the Phoenixville and Honeybrook Quadrangles, Chester County, Pennsylvania: Pa. Acad. Sci. Proc., v. 25, p. 113-119, illus., 1951. Problems are outlined but not solved. They are: (1) general stratigraphic relationships of the Pickering Gneiss and Franklin Limestone, (2) origin of associated ultramafic rocks, and (3) the origin of the acidic igneous rocks. Ages and structural history are all uncertain. The major features of each rock type are discussed.
3. (and Jaffe, H. W.). Lead-alpha age determinations of zircon from the Swarthmore Granodiorite and associated rocks [Philadelphia Co.]: Pa. Acad. Sci. Proc., v. 31, p. 120-123, illus., 1957. Zircons in Wissahickon Schist are dated between 410 and 413 million years; from the intermediate replacement type of the Swarthmore Granodiorite the dates are 230-240 million years. Aplitic granodiorite is 243 million years and the Swarthmore Granodiorite is 218-290 million years. The morphology of the zircons suggests that those in the Wissahickon Schist may be original sedimentary particles; those in the younger rocks are more euhedral and more likely to be secondary.

POWELL, W. BYRD

1. Coal mines of Nantico [Luzerne Co.] in the Allegheny Mountains [abs.]: Atlantic Jour. and Friend of Knowledge, v. 1, p. 115, 1832.

POWERS, SIDNEY, 1890-1932.

1. Occurrence of petroleum in North America: Am. Inst. Min. and Metall. Engineers Tech. Pub. 377, 46 p., illus., 1931; . . . Trans. 1931, p. 489-533, illus., 1931. A general review of petroleum occurrence includes that of the Commonwealth. No new data are included.

POWNALL, THOMAS, 1722-1805.

1. A topographical description of such parts of North America as are contained in the (annexed) map of the Middle British Colonies in North America, vi, 46, 16 p., illus., London, J. Almon, 1776; 3d ed., Mulkearn, L. (editor), A topographical description of the dominions of the United States of America [being a revised and enlarged edition]. 235 p., illus., Pittsburgh, Univ. Pittsburgh Press, 1949. Descriptions of the topography of the Commonwealth are given. An edition of Lewis Evans' 1755 map is used as a base.

PRATT, WALLACE EVERETTE

1. The earth's petroleum resources, Pt. 1 *of* Our oil and natural gas reserves, *in* Fanning, L. M., ed., Our oil resources, p. 112-142, illus., 1945. The Commonwealth has over 123 million barrels of proven reserves.
2. Frank Walbridge DeWolf (1881-1957): Am. Assoc. Petroleum Geologists Bull., v. 42, p. 1117-1121, port., 1958.

PRESS, FRANK, *see* Ewing, W. M., 1.

PRESTON, FRANK W.

1. (and Prouty, C. E., and Ingham, A. I.). Tour II, Glacial "foreland" of northwest Pennsylvania, *in* Field Conf. of Pa. Geologists 19th, Pittsburgh 1950, p. 11-36 (‡), illus., [n. p.] [1950]. A short description of the glacial features associated with Lake Arthur in Lawrence and Beaver Cos. is followed by a detailed road log itinerary for visits to various exposures demonstrating drainage changes along the Wisconsin ice front and pondings to the south and east of it. Maps of pre-glacial and Pliocene drainage, and Lake Arthur with its daughters, Lakes Watts and Edmond, are included.

PRICE, JOHN WILLIAM, SR., L.F.D.

1. A new locality for Upper Triassic vertebrate fossils in Lancaster County, Pennsylvania: Pa. Acad. Sci. Proc., v. 30, p. 167-169, illus., 1956. *Hypsognathus fenneri,* a cotylosaur from the Brunswick Formation, is described and illustrated.

PRICE, PAUL HOLLAND

1. Israel Charles White, geologist (1848-1927): Compass, v. 35, p. 149-153, port., 1958; slightly revised, GeoTimes, v. 3, no. 8, p. 12-13, 35, 1959.

PRICE, WILLIAM ARMSTRONG, *see* Swartz, C. K., 2.

PROSSER, CHARLES SMITH, 1860-1916.

1. (and Kindle, E. M., and Swartz, C. K.). The Middle Devonian deposits of Maryland: Md. Geol. Survey, Middle and Upper Devonian, p. 25-114, 1913. Many fossil lists and measured sections from Fulton and Bedford Cos. are included.
2. (and Swartz, C. K.). The Upper Devonian deposits of Maryland: Md. Geol. Survey, Middle and Upper Devonian, p. 341-534, illus., 1913. Sections are measured and fossils are listed from Fulton Co.

PROUTY, CHILTON EATON, *see also* Bolger, R. C., 6; Gray, C., 5; Preston, F. W., 1.

1. "Leesport" and "Annville" Formations of [southeastern] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 62, p. 1471, 1951.
2. Unusual stylolites in Ordovician limestones of eastern Pennsylvania: Compass, v. 30, p. 11-14, illus., 1952. Transverse stylolites, formed by differential solution along joint planes, are described from near Harrisburg, Dauphin Co., Myerstown, Lebanon Co., and Marion, Franklin Co. They are rare.
3. The Stonehenge-Larke relationship, central Pennsylvania: Pa. Acad. Sci. Proc., v. 28, p. 120-123, illus., 1954. Stratigraphic and lithologic evidence is used to suggest that the Larke Dolomite is a facies of the Stonehenge Limestone. The Larke is dolomitized Stonehenge, but the name Larke can continue to be used as a formation however, because of its now-distinctive appearance. It is Lower Ordovician in age.
4. "Stones River Group" in Pennsylvania [abs.]: Geol. Soc. America Bull., v. 67, p. 1822, 1956.
5. Sedimentary successions in the Pennsylvanian Allegheny and Conemaugh Series, western Pennsylvania: N. Y. Acad. Sci. Trans, 2d ser., v. 19, p. 681-689, illus., 1957. Since most of the lithologic units are indistinguishable, most correlation must be done on the basis of the stratigraphic interval between key units. Generalized sections show the Pottsville Series to have a high sandstone percentage; the Allegheny Series more shale; the Conemaugh Series has more well-developed marine limestone; and the Monongahela Series has more fresh-water limestones. Cycles are noted in all the units. The average cyclothem thickness is 35 feet.
6. Influence of paleostructural elements on the Paleozoic stratigraphy of eastern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1659, 1959.

7. The Annville, Myerstown and Hershey Formations of Pennsylvania: Pa. Geol. Survey 4th ser., Bull. G31, v, 47 p., illus., 1959. The stratigraphic relationships and lithologic characteristics of these formations in the Great Valley are described and discussed. The old "Leesport" is divided into, from oldest to youngest: (1) Annville Limestone, (2) Myerstown Limestone, and (3) Hershey Limestone. Sections are measured.

PROUTY, WILLIAM FREDERICK, 1879-1949, *see* Swartz, C. K., 5.

PUMPELLY, RAPHAEL, 1837-1923.

1. Geographical and geological distribution of the iron ores of the United States: U. S. Census 10th, v. 15, p. 3-36, illus., 1886. A general survey of the ores of iron include geological and statistical descriptions of those in the Commonwealth. Pennsylvania was second only to Michigan in iron ore value in 1880, although it was first in tonnage of ore mined.
2. Memorial of Thomas Sterry Hunt [1826-1892]: Geol. Soc. America Bull., v. 4, p. 379-393, 1893.

RADER, HERBERT L.

1. Geology of Valley Forge Park [Chester Co.] and vicinity. M. S. thesis, Lehigh Univ., 1951.

RADISI, JOHN

1. A report on the geology of Upper and Lower Turkeyfoot Townships, Confluence Quadrangle [Somerset Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1954.

RAFINESQUE, CONSTANTIN SCHMALZ, 1783-1840, *see also* Featherstonhaugh, G. W., 1.

1. Description of some of the fossil teeth found in a cave in [Cumberland Co.] Pennsylvania: Atlantic Jour. and Friend of Knowledge, v. 1, p. 109-110, illus., 1832. *Odocoileus speleus* from a cave near Carlisle is described and illustrated. It is a mammal and is [Pleistocene] in age.
2. Extracts of a series of letters . . . : Atlantic Jour. and Friend of Knowledge, v. 1, p. 65-67, 1832. The origins of rocks and coal are the result of submarine pseudo-volcanoes, forming salses, or pulses. *Mesiphites clavata* is listed from the [Pleistocene] clay at Philadelphia.
3. Fossils of Sherman Creek [Perry Co.]: Atlantic Jour. and Friend of Knowledge, v. 1, p. 122, 1832. A list of plants and invertebrates from (?) Devonian rocks is given.
4. Geological survey of the Allegheny Mountains of Pennsylvania, in 1818, from west to east: Atlantic Jour. and Friend of Knowledge, v. 1, p. 105-109, 1832. A diary-like description of Pennsylvania, from Pittsburgh eastward to Gettysburg, is given. Little detail is included.
5. *Lucilites nigra,* a new univalve fossil shell, from the Allegheny Mountains of [Bedford Co.] Pennsylvania: Atlantic Jour. and Friend of Knowledge, v. 1, p. 116-117, 1832. A *Patella*-like shell is described from [? Ordovician] rocks near Bedford Springs.
6. New fossil shells of [Perry Co.] Pennsylvania: Atlantic Jour. and Friend of Knowledge, v. 1, p. 142, illus., 1832. Eight pelecypods from (?)Devonian rocks along Sherman Creek in Perry Co. are described and illustrated.
7. Alleghanies Mountains: Atlantic Jour. and Friend of Knowledge, v. 1, p. 157-161, 1833. A cursory, physical description of the Appalachian Mountains in the Commonwealth and elsewhere is given. No new data are included.

RAINE, JOHN WESLEY, 3d

1. Cyclic sedimentation of the Upper Allegheny Series in the Kittanning-Freeport area [Armstrong Co.]. M. S. thesis, Univ. Pittsburgh, 1953.

RAISZ, ERWIN JOSEPHUS

1. Map of the landforms of the United States: Internatl. Geog. Cong. 17th, Washington, D. C., Pub. no. 5, scale about 1 inch to 70 miles, 1952. The physiographic features of the Commonwealth are included.
2. [Map of] United States and Canada—physiography. Scale 1:12,000,000 (about 1 inch to 190 miles), Chicago, Rand McNally and Co. [1954 ?].

RALSTON COAL ESTATE

1. Advantages of Ralston, Lycoming Co., Pennsylvania for the manufacture of iron. 18 p., illus., New York, Tribune Job Printing Est., 1843. This is a

stock prospectus for property near Ralston. Coal, iron ore, limestone, and fire clay are present and are described.

RANDALL, H. R., *see* Turner, H. G., 1.

RANDALL, JOHN A.

1. The use of the dip-needle in locating contacts: Compass, v. 36, p. 114-123, illus., 1959. Dip-needle traverses across the Dove Lake serpentine body and a serpentine body near Gladwyne, Montgomery Co., reveal the contacts of the units with the local country rock by a reversal of the direction of dip of the needle. Four traverses across the "Martic Line" in Lancaster Co. are also made. The Wissahickon Schist-Conestoga Formation contact is plotted.

RANDOLPH, JAMES RAYMOND, *see* O'Brien, G. D., 2.

RASETTI, FRANCO RAMO DINO

1. Trempealeauian trilobites from the Conococheague, Frederick, and Grove Limestones of the central Appalachians [Franklin Co.]: Jour. Paleontology, v. 33, p. 375-398, illus., 1959. A fauna of 15 trilobite species from the Cambrian Conococheague Limestone is described and illustrated.

RAU, JON L.

1. Upper Devonian and Lower Mississippian *Leptodesma* from southwestern Pennsylvania. M. S. thesis, Univ. Cincinnati, 1955.

RAY, LOUIS LAMY

1. Kirk Bryan [1888-1950]: Geog. Review, v. 41, p. 165-166, 1951.

RAY, SATYA BRATA

1. The mineralogy of the Jacksonburg Formation in eastern Pennsylvania and western New Jersey. Ph.D. thesis, Lehigh Univ., 1957; [abs.], Dissert. Abs., v. 17, p. 2280-2281, 1957.

RAYMOND, PERCY EDWARD, 1879-1952.

1. John Mason Clarke (1857-1925): Am. Acad. Arts and Science Proc., v. 69, p. 498-502, 1935.
2. Edward Oscar Ulrich [1857-1944]: Science, v. 99, p. 256, 1944.
3. The genera of fossil Conchostraca, an order of bivalved Crustacea: Harvard Coll. Mus. Comp. Zool. Bull., v. 96, p. 215-307, illus., 1946. A monograph of the group includes descriptions and illustrations of the following from the Commonwealth: *Pseudestheria ovata* and *P. hindei* from Triassic rocks in Chester Co., *P. lewisi* from Triassic rocks in Bucks Co., *P.* (?) *pennsylvanica* from Triassic rocks in York Co., *Monoleiophus unicostatus, Hemicycloleaia leavis,* and *H. ashleyi* from Pennsylvanian rocks in Cambria Co.; and *Leaia leidyi* from the Mississippian Mauch Chunk Formation in Schuylkill Co.

RAYMOND, ROSSITER WORTHINGTON, 1840-1918

1. Biographical notice of John Birkinbine [1844-1915]: Am. Inst. Min. and Metall. Engineers Bull. [103], p. 1437-1442, port., 1915.

READ, CHARLES BRIAN

1. Floras of the Pocono Formation and Price Sandstone in parts of Pennsylvania, Maryland, West Virginia, and Virginia: U. S. Geol. Survey Prof. Paper 263, iii, 32 p., illus., 1955. Sections throughout the Commonwealth are listed, and the flora is described and illustrated. Many species are new.

READ, EDWARD WADE

1. The Honesdale Sandstone, a key horizon for the Pocono Plateau in northeastern Pennsylvania. M. S. thesis, Lehigh Univ., 1953.

REDFIELD, ARTHUR HUBER

1. The petroliferous provinces of the United States [abs.]: Wash. Acad. Sci. Jour., v. 17, p. 235-237, 1927.

REED, JOHN CALVIN, *see* Cloos, E., 4.

REESIDE, JOHN BERNARD, JR., 1889-1958.

1. The Helderberg and Tonoloway Formations, with special reference to the Siluro-Devonian boundary. Ph.D. thesis, Johns Hopkins Univ., 1915.
2. Stratigraphic nomenclature in the United States: Internatl. Geol. Cong. 16th, United States 1933, Guidebook 29, 7 p., illus., Washington, D. C., 1932. A brief introduction to the philosophy of stratigraphic terminology is followed by 10 time-rock correlation charts. The Commonwealth's rocks are included on all of the charts but those of the Jurassic, Cretaceous, and Tertiary.
3. (Chairman, and others). Correlation of the Triassic formations of North

America, exclusive of Canada: Geol. Soc. America Bull., v. 68, p. 1451-1513, illus., 1957. A time-rock chart of Triassic sections from all over North America includes those from the Commonwealth.

REEVES, FRANK

1. Origin of the natural brines of oil fields: Johns Hopkins Univ. Circ. new ser. 1917, no. 3, p. 57-68 [255-266], 1917. Studies of oil field water in southwestern Pennsylvania and elsewhere show that it is truly connate. The conclusion is based on: (1) the distribution of the water in the rocks, (2) the lack of an explanation for the removal of the marine water of deposition, (3) the sedimentary sequence indicating that the water accumulated with the sediments, and (4) the chemical nature of the brines.
2. The carbon-ratio theory in the light of Hilt's law: Am. Assoc. Petroleum Geologists Bull., v. 12, p. 795-823, illus., 1928. Evidence is produced from the Commonwealth and elsewhere that the carbon-ratio theory, relating coal to petroleum and the rank of coal to horizontal pressure, may not be valid because the depth of burial appears to be a heat-producing factor also.

REITZ, ELLIOTT

1. Worthless Cave, Clarion County: Nittany Grotto Newsletter, v. 7, p. 119 (‡), illus., 1959. A brief description and sketch map of the cave are given.

REITZ, T. A. DE

1. The deformation of the Pre-Cambrian peneplain of North America: Geol. Foren. Stockholm Forh., v. 47, p. 250-257, illus., 1925. A map shows that the peneplain which had been formed at the end of Precambrian time lies below 1000 feet in elevation in most of the Commonwealth and that in the southeastern part it has been deformed by folding and faulting. It begins to rise in elevation in the north west corner. It is between 0 and 1000 feet in the extreme southeastern corner.

RENICK, B. COLEMAN

1. The correlation of the Lower Allegheny-Pottsville section in western Pennsylvania. Ph.D. thesis, Univ. Chicago, 1923.

RESSER, CHARLES ELMER, 1889-1943.

1. Memorial of Anthony W[ayne] Vogdes [1843-1923]: Geol. Soc. America Bull., v. 35, p. 184, 1924.
2. New Lower and Middle Cambrian Crustacea [Lancaster Co.]: U. S. Natl. Mus. Proc., v. 76, art. 9, 18 p., illus., 1929. *Anomalocaris pennsylvanicus, Roddyia typa, Trizoia getzi* and *T.* (?) *dunbari* from the Kinzers Shale are described and illustrated.
3. Preliminary generalized Cambrian time scale: Geol. Soc. America Bull., v. 44, p. 735-756, 1933. A resumé of Cambrian stratigraphic terminology includes that from the Commonwealth.
4. Nomenclature of some Cambrian trilobites: Smithson. Misc. Coll., v. 93, no. 5, 46 p., 1935. *Alokistocare aoris* (Walcott) from Blair Co. is included in a discussion of nomenclatural changes.
5. Second contribution to nomenclature of Cambrian trilobites: Smithson. Misc. Coll., v. 95, no. 4, 29 p., 1936. *Bonnia wanneri, B. tumifrons, B. capito* from the Kinzers Formation of York Co., and *Kingstonia ara* from the Warrior Limestone in Centre Co. are discussed in a nomenclatural review.
6. Fourth contribution to nomenclature of Cambrian fossils: Smithson. Misc. Coll., v. 97, no. 10, 43 p., 1938. *Menomonia avitis* from the Warrior Limestone in Centre Co. is discussed in a nomenclatural review.
7. Fifth contribution to nomenclature of Cambrian fossils: Smithson. Misc. Coll., v. 101, no. 15, 58 p., 1942. *Tellerina scotlandensis* from the Conococheague Limestone in Franklin Co. is discussed.
8. New Upper Cambrian trilobites: Smithson. Misc. Coll., v. 103, no. 5, 136 p., illus., 1942. *Burnetia pennsylvanica* and *Cheilocephalus buttsi* from the Ore Hill Limestone in Blair Co. and *Kingstonia ara, K. kindlei, Blountia kindlei,* and *Coosella brevis* from the Warrior Limestone in Centre Co. are described and illustrated.

RHOADS, SAMUEL N.

1. Distribution of the American bison in Pennsylvania, with remarks on a new fossil species [Bucks Co.]: Acad. Nat. Sci. Philadelphia Proc., [v. 37] 1895,

p. 244-248, 1895; addition with title, Note on "*Bison appalachicolus*" Rhoads, . . . Proc. 1897, p. 492, 1897. A resumé of bison-bone reports is given. *Ovibus (Bootherium?) appalachicolus* from Bucks Co. is described. It is post-Pliocene.

RHODES, ROGER FARNSWORTH, *see* Savage, J. L., 1.

RICE, W. E., *see* Fieldner, A. C., 5; Harr, L., 1; Kirgis, F. L., 1.

RICH, JOHN LYON, 1884-1956.

1. Recognition and significance of multiple erosion surfaces: Geol. Soc. America Bull., v. 49, p. 1695-1722, illus., 1938. Illustrations are taken from the Commonwealth and elsewhere to show that many of the criteria used to support the concept of multiple erosion surfaces are not valid.
2. Origin of compressional mountains and associated phenomena: Geol. Soc. America Bull., v. 62, p. 1179-1222, illus., 1951. Compressional mountains, including the Appalachians in Pennsylvania, reveal a pattern and cycle of events so consistent as to suggest a common genesis. A central magma-bearing area is upwarped and feeds sediments into geosynclinal basins on each side. Such upwarping causes periodic thrusting.
3. Probable fondo origin of Marcellus-Ohio-New Albany-Chattanooga bituminous shales: Am. Assoc. Petroleum Geologists Bull., v. 35, p. 2017-2040, illus., 1951. The Devonian Marcellus Shale in the Commonwealth is a tongue of a great deep-water-deposited black shale unit. Evidence is given to support its deep water origin as opposed to a shallow water origin.

RICHARDS, HORACE GARDINER

1. Record of the rocks—the geological story of eastern North America. xiii, 413 p., illus., New York, Ronald Press Co., 1953. A textbook of historical geology includes many examples from the Commonwealth.
2. Geology of the Delaware Valley. 106 p., illus., Philadelphia, Mineralog. Soc. Pa., 1956. The counties adjacent to the Delaware River are in the area of the discussion. A semi-popular description of the topography, stratigraphy, and economic resources of the area is given. Precambrian-Ordovician, Triassic rocks and Pleistocene-aged material are present. It is intended for the person who wants a guide to mineral- and fossil-collecting locations.
3. Ordovician fossils from Montgomery County, Pennsylvania: Pa. Acad. Sci. Proc., v. 32, p. 139-140, 1958. Gastropods and cephalopods from the Shenandoah Limestone are listed.

RICHARDS, RALPH WEBSTER, *see also* Wood, R. H., 1.

1. Memorial to George Burr Richardson [1872-1949]: Geol. Soc. America Proc. 1951, p. 135-140, port., 1952.

RICHTER, RUDOLF

1. Henry Fairfield Osborn [1857-] und "Senckenberg": Natur und Volk, v. 64, p. 435-439, port., Frankfort a. Main, 1934.
2. Henry Fairfield Osborn [1857-1935]: Natur und Volk, v. 66, p. 51-53, port., Frankfort a. Main, 1936.

RIDGWAY, THOMAS S., *see* Bear Valley Coal Company, 1.

RIEG, LOUIS EUGENE

1. A petrographic and x-ray study of the dolomite distribution in certain Cambro-Ordovician limestones of central and south-central Pennsylvania. Ph.D. thesis, Univ. Pittsburgh, 1958; [abs.], Dissert. Abs., v. 19, p. 2064, 1959.

RIFFELMACHER, WALLACE EDWIN

1. Microspores of the Lower Kittanning coal in its type area [Armstrong Co.]. M. S. thesis, Pa. State Coll., 1952.

RIGAUD, F.

1. Les gisements de pétrole d'Amérique—les États-Unis et le Canada: La Nature, Ann. 51, p. 51-54, illus., Paris, 1923. A generalized review of the industry includes that of the Commonwealth. Few data are given.

RIMA, DONALD ROBERT

1. Ground water resources of the Lansdale area [Montgomery Co.], Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 146, iv, 24 p., illus., 1955. Only Triassic rocks are present. They and their water-bearing properties are described. Electric log correlations are used between wells. The engineering and hydrology problems are described. Artesian aquifers are present also.

RIPLEY, HARRIET ERNESTINE, 1872-.

1. Bibliography of the published writings of Henry Fairfield Osborn for the years 1877-1910. 30 p., Lancaster, Pa., Press of the New Era Printing Co., 1911.
2. Bibliography of the published writings of Henry Fairfield Osborn for the years 1877-1915, 2d ed., 74 p., Lancaster, Pa., [priv. pub.], 1916.

RISLER, GEORGE

1. (and Mislay, A.). Trio of Pennsylvania caves: Natl. Speleol. Soc. Bull. 8, p. 85-87, illus.. [1948]. Very brief descriptions of Hineman Cave in Butler Co., Strangford Cave in Indiana Co., and Bear Cave in Westmoreland Co., are given. Strangford Cave is mapped.

RITTENHOUSE, GORDON

1. Oil and gas possibilities in the early Silurian rocks of the northern Appalachian Basin *in* Prospects for discovery of oil and gas beyond proven areas and from deeper horizons in the Appalachian region: Am. Petroleum Inst. Div. Production Paper 826-20-C, 8 p., illus., 1949. The oil and gas possibilities of the "Clinton" sand and other early Silurian rocks are discussed. Data are from drill cuttings. Several sand pinchouts are recognized, and the kind. extent, and trends of the possible producing zones are considered. Small-scale isopach maps are included.

ROBERTS, HENRY B., *see* Howell, B. F., Sr., 2; Willard, B., 20.

ROBERTS, JOHN L.

1. Stratigraphy of the Lower Kittanning cycle in northwestern Clearfield County, central Pennsylvania. M. S. thesis, Pa. State Univ., 1959.

ROBERTS, WILLIAM F., *see also* Northwestern Pa. Oil and Coal Co., 1.

1. Report upon the West Hazleton and Catawissa Falls, and the East Mahoney Coal and Iron Estates . . . in Luzerne and Schuylkill Counties, Pa. . . . . 22 p., illus., Philadelphia, J. C. Clark, 1846. Descriptions are given of the various anthracite beds exposed in the area. Iron ore, of uncertain nature, but bedded, is present also. No stratigraphic or structural data are included.
2. (and Strong, H. K.). Report to the directors of the Pequa Railroad and Improvement Co. [Dauphin, Lebanon Cos.]. 20 p., illus., Philadelphia, T. K. and P. C. Collins, 1849; with title, Geological report upon the Dauphin and Susquehanna Coal Company's mineral lands in Dauphin and Lebanon Counties, Pennsylvania. 35 p., New York, Van Norden and Amerman, 1851. A report for a prospectus discusses the occurrence of anthracite in the western part of the Southern Field.
3. [Geological] Report upon the coal lands, *in* The report of J. W. Allen, esq., civil engineer upon the practicability of extending the Morris and Essex line of rail road . . . from the Delaware Water Gap [Monroe Co.] to Wilkes-Barre [Luzerne Co.], p. 36-41, New York, Snowden, 1853. The occurrence of anthracite coal in Pittston Township, Luzerne Co., is described. One bed is 14 feet thick. Very little geological information is included.
4. (and Strong, H. K.). Report upon the Huntingdon and Broadtop Railroad and Coal Company's coal lands [Bedford, Huntingdon Cos.]. 16 p., illus., Philadelphia, J. C. Clark, 1853. This is a report designed to accompany a prospectus. Bituminous coal, iron, and limestone are the mineral resources present.
5. Report upon a coal property in . . . Luzerne County . . . of Thomas P. Remington. . . . 15 p., illus., Philadelphia, McLaughlin Bros., 1857. This is a report designed to accompany a stock prospectus. Only anthracite coal is considered.
6. Report upon the property of the Stafford Meadow Coal, Iron, and City Improvement Company, of Scranton [Lackawanna Co.] . . . Pennsylvania. 11 p., illus., Philadelphia, McLaughlin Bros., 1858. The property, in Providence Township, on the Lackawanna River, is described in a prospectus. Anthracite coal and iron ore are present and are cursorily described.
7. Report upon a body of land . . . in Luzerne and Wayne [Cos.] . . . of C. S. Whalen. . . . 16 p., illus., Philadelphia, McLaughlin Bros., 1863. This is a report designed to accompany a stock prospectus. Only anthracite coal is present.

8. Report upon . . . coal lands . . . known as Bear Valley Coal Lands [Schuylkill, Dauphin Cos.], *in* [Anonymous], [Prospectus of] "Bear Valley Coal Company" Reports. . . , p. 11-22, illus., Boston, Wright and Potter, 1863. A report for a prospectus discusses the occurrence of anthracite coal in the region.
9. Reports . . . on the Shamokin Coal lands known as "Robert Gray", "Samuel Wetherill" tracts, and "Henry Clay" Colliery. 21 p., Boston, 1863; 2d ed., 1863. [not seen]
10. (and Kropff, F. C.). Report on McCauley Mountain coal lands, Columbia Co., Pa., Boston, 1864. [not seen]
11. (and Kropff, F. C.). Report on the Tomhicken Mining property . . . Lehigh region of [Luzerne Co. ?] Pennsylvania. 11 p., Boston, G. C. Rand and Avery, 1864. A report for a prospectus discusses the occurrence of the anthracite coal.
12. Report . . . on the tract of coal land known as the "John Brady" tract, Shamokin [Northumberland Co.], Pa., Boston, 1864. [not seen]
13. Report upon a body of land underlaid with anthracite coal, situated on Red Mountain . . . Schuylkill County . . . of R. A. Parrish, Jr. and others. 7 p., illus., Philadelphia, Crissy and Markley, 1864. A report for a prospectus discusses the occurrence of anthracite in the area.
14. Report upon the property of the Ashburton Coal Company . . . Schuylkill and Luzerne Counties . . . , *in* [Hartley, W. M. B. ?] Prospectus and reports of the Ashburton Coal Company's estate, Schuylkill and Luzerne Counties, Penn., p. 7-16, illus., New York, Dodge and Grattan, 1864. A report accompanying a prospectus describes the occurrences of anthracite coal, iron ore, and limestone.
15. General geological and mineralogical report on the lands contiguous to the Big and Little Nescopec Creeks . . . Luzerne Co., ... 7 p., Bloomsburg, Pa., "Republican" office, 1865. This is a report designed to accompany a prospectus. The company is urged to purchase land underlain by Devonian strata in hopes of finding oil. The anticlinal theory is proposed or, at least, suggested.
16. Report upon a body of land [of North Carbondale Coal Co.] underlaid with anthracite coal situated in the Valley of the Lackawanna in the counties of Luzerne and Wayne . . . . 16 p., illus., New York, Davis and Fitzgerald, 1865. This is a report designed to accompany a prospectus. Only anthracite coal is discussed.
17. (and Kropff, F. C.). Reports . . . upon the bituminous coal property situated in the Snow-Shoe Basin, Centre Co., Pennsylvania, *in* [Ketcham, W. W.] The Bird Coal and Iron Company located in the Shamokin and Snow-Shoe regions of Northumberland and Centre Counties . . . , p. 11-17, illus., Philadelphia, Ringwalt and Brown, 1865. This is a report for a prospectus. The bituminous coal deposits are described.

ROBINSON, CLAIR WILLARD

1. The early development of the coal industry in Pennsylvania: Compass, v. 23, p. 249-263, illus., 1943. This is an historical review of the coal industry. The first reference to bituminous coal from the Commonwealth was by John Pattin, a trader, on a map dated 1750. Anthracite coal was known earlier probably, but the dates are uncertain. It is called "stone coal" on a map of 1768.

ROBINSON, J. FRENCH

1. Geology of the Appalachian area: Oil and Gas Jour., v. 26, no. 4, p. G 12-13, 16-19, 22-30, illus., 1927. A general survey and review of the Appalachian Basin, from the point of view of natural gas occurrences, includes the Commonwealth. Cambrian-Pennsylvanian rocks are described. Numerous sketch maps and cross sections show the structures. Tables show the depths to various reservoirs in different places.
2. (and Jones, V., and Gaddess, J.). Subsurface structure of the [Tioga Co.] northern Pennsylvania and southern New York natural gas fields: Pa. State Coll., Mineral Industries Exper. Sta. Bull. 11, p. 9-18, illus., 1932; condensed, Oil and Gas Jour., v. 31, no. 12, p. 10-12, illus., 1932. The Tioga gas field is compared to others; it is on an asymmetrical anticline with the south flank the steeper. It is faulted in the subsurface by faults which appear to

be from underthrusting. The folds and faults become more intense with depth. The primary energy was probably in the basement rocks and was reflected in the sedimentary rocks above.

RODGERS, JOHN

1. Absolute ages of radioactive minerals from the Appalachian region: Am. Jour. Sci., v. 250, p. 411-427, illus., 1952. A study of the accumulated data on dated rocks suggests that Precambrian rocks are relatively rare. Four orogenies are suggested; two are Precambrian, the others are the Taconic and Acadian. The Appalachian Revolution is not as well recorded as are the others. Triassic rocks are about 170 million years old. Dates are obtained from Northampton, Adams, Chester, Berks, and York Cos.
2. The folds and faults of the Appalachian Valley and Ridge Province: Ky. Geol. Survey ser. 9, Spec. Pub. 1, p. 150-166, illus., 1953. A general review of the major structural features includes those of the Commonwealth. The theory that the basement rocks are *not* involved in the folding is supported.

ROGERS, DOUGLAS, JR.

1. Review of Sub-Devonian exploration in the northern Appalachian Basin: Petroleum Engineer, v. 27, no. 3, p. B35-B42. illus. incl. port., 1955. A generalized discussion of Cambrian-Silurian stratigraphy includes that of the Commonwealth. The stratigraphic interpretations of significant oil wells are described; some are in Pennsylvania.

ROGERS, HENRY DARWIN, 1802-1863.

1. (and Bache, A. D.). Analysis of some of the coals from [Lycoming and Schuylkill Cos.] Pennsylvania: Acad. Nat. Sci. Philadelphia Jour., v. 7, p. 158-177, 1834.
2. Report on the geology of North America: British Assoc. Adv. Sci. Rept. 4, p. 1-66, London, 1835. A generalized description of the geology of the United States includes cursory references to that of the Commonwealth.
3. Geological map of Chester County, *in* Flora Cestrica, by W. Darlington, West Chester, Pa., S. Siegfried, 1837. A small map outlines the limestone, serpentine, red shale, talc slate, gneiss, and mica slates of the county.
4. Address delivered at a meeting of the Association of American Geologists and Naturalists . . . : Am. Jour. Sci., v. 47, p. 137-160, 247-278, 1844. A review of geological development to date includes a brief summary of the Paleozoic rocks of the eastern United States, including those of the Commonwealth. The Latin names for the times of the day are applied to various stratigraphic units within the Paleozoic Era.
5. [Structural features of the Appalachians . . . .] [abs.]: Am. Assoc. Adv. Sci. Proc., v. 2, p. 113-115, 1850.
6. Geological map of the United States and British North America. Scale, 1 inch to about 100 miles, *in* Johnston, A. K., Physical atlas of natural phenomena, pl. 8, Edinburgh, 1856.
7. On the correlations of North American and British Paleozoic strata [abs.]: British Assoc. Adv. Sci. Rept. 1856, [pt. 2], p. 175-186, London, 1857.
8. On the geology and physical geography of North America: Roy. Inst. Great Britain Proc., v. 2, p. 167-187, London, 1856; Franklin Inst. Jour. 3d ser., v. 33, p. 224-230, 319-326, 363-368, 1857; Mining Mag., v. 8, p. 417-424; v. 9, p. 45-51, 514-522, 1857. A generalized discussion of the physiographic provinces includes those of the Commonwealth. A brief resumé of the major geologic features, coal, and gold is also included.
9. Coal and petroleum: Harpers New Monthly Mag., v. 27, p. 259-264, 1863; discussion by J. V. Howell with title, How old is petroleum geology? Am. Assoc. Petroleum Geologists Bull., v. 14, p. 607-616, 1930. Rogers made the first reference to the anticlinal theory of petroleum accumulation. Examples are taken from the Commonwealth.

ROGERS, WILLIAM BARTON, 1804-1882.

1. [Siderite associated with coal]: Boston Soc. Nat. Hist. Proc., v. 5, p. 283-288, 1856; Am. Jour. Sci. 2d ser., v. 21, p. 339-343, 1856; Mining Mag., v. 6, p. 201-207, 1856. Siderite (called protocarbonate of iron) occurs in shales and fire-clays as nodules and plates. It results from the alteration of hematite by decaying vegetation. No specific locations are given.

2. [Triassic rocks in the eastern United States]: Boston Soc. Nat. Hist. Proc., v. 5, p. 14-18, 1856. Fossils and other features of the Triassic rocks from the Carolinas to Pennsylvania are discussed. The age equivalency of all of the areas, based on fossils, is discussed. He considers them Jurassic in age.

ROMER, ALFRED SHERWOOD

1. Notes on certain American Paleozoic fishes: Am. Jour. Sci., v. 240, p. 216-228, illus., 1942. *Amblypteris stewarti* from the Permian Upper Washington Limestone in Washington Co. is described and illustrated.
2. Review of the Labyrinthodontia: Harvard Coll. Mus. Comp. Zool. Bull., v. 99, p. 1-368, illus., 1947. The amphibians from the Pennsylvanian and Permian beds of southwestern Pennsylvania are discussed in relationship to their stratigraphic and geographic position, and are compared with others around the world. No new forms are described.
3. Late Pennsylvanian and early Permian vertebrates of the Pittsburgh-West Virginia region, *in* Fossil vertebrates of the tri-state area: Carnegie Mus. Annals, v. 33, p. 47-112, illus., 1952. Fish, amphibians, and reptiles are described. Some descriptions are very cursory; the following are in detail; most are illustrated: *Diploceraspis burkei, D. conemaughensis,* (?) *Lysorophus dunkardensis,* (?) *Megamolgophis agnostinii, Desmatodon hollandi,* and *Edaphosaurus raymondi,* all amphibians, are from the Pennsylvanian rocks of Allegheny Co. From Permian rocks come *Megamolgophis agnostinii* from Washington Co. and *Edaphosaurus boanerges* from Greene Co.

ROMISCHER, W. M., *see* Ash, S. H., 4.

RONES, MORRIS, *see also* Swartz, F. M., 6.

1. A litho-stratigraphic, petrographic, and chemical investigation of the lower Middle Ordovician carbonate rocks in central Pennsylvania. Ph.D. thesis, Pa. State Univ., 1955.

ROOT, ANTHONY AND CO.

1. Map of the oil district, Venango, Crawford, and Warren Counties, Pennsylvania. Scale 1 inch to 2300 feet, New York, R. C. Root and Anthony and Co., 1864.

ROSENFELD, MELVIN ARTHUR, *see also* Griffiths, J. C., 3, 5.

1. Problem of porosity [central Pa.] [abs.]: Geol. Soc. America Bull., v. 61, p. 1498, 1950.
2. (and Griffiths, J. C.). A new approach to the problem of porosity measurement [— Pt. 1]: Producers Monthly, v. 15, no. 9, p. 23-28, illus., 1951; Pt. 2, . . . no. 10, p. 31-39, illus., 1951; revised, Pa. State Coll. Mineral Industries Exper. Sta. Bull. 56, p. 163-201, illus., 1951. Samples of the Oswego Sandstone from central Pennsylvania and the Bradford Third Sand from McKean County are used in demonstrations of rigorous statistical techniques to determine porosity. Variations of porosity within and between samples and beds are studied.
3. Petrographic variation in the Oriskany Sandstone [eastern U. S.] [abs.]: Geol. Soc. America Bull., v. 65, p. 1298-1299, 1954.

ROSENZWEIG, ABRAHAM

1. (and Watson, E. H.). Some hornblendes from [Chester, Philadelphia Cos.] southeastern Pennsylvania and Delaware: Am. Mineralogist, v. 39, p. 581-599, illus., 1954. Hornblende was studied with special reference to genetic relationships. Chemical analyses and optical data are presented. The K and Na contents of the hornblende are correlated with the degree of granitization of the host rock. The total K and the K/Na ratio in the vacant positions of the lattice increase with increased granitization.

ROSS, CLARENCE SAMUEL

1. William Shirley Bayley, 1861-1943: Econ. Geology, v. 38, p. 263-264, 1943.
2. Memorial of William Shirley Bayley [1861-1943]: Am. Mineralogist, v. 29. p. 115-120, port., 1944.

ROSS, D. W., *see* Greig, J. W., 1.

ROSS, RALPH BURGESS

1. Structures in the Conemaugh Formation near Bakersfield Station [Allegheny Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh. 1933.

ROTHROCK, HOWARD EUGENE, *see also* Danilchik, W., 1; Haley, B. R., 1, 2; Maxwell, J. A., 1.

1. A summary and critique of the estimates of Pennsylvania anthracite reserves: Pa. Acad. Sci. Proc., v. 24, p. 192-197, 1950. The first reserve estimate was by Sheafer in 1881; it was over 29 billion tons. Numerous other estimates have been made, the latest by Ashley in 1945; he estimated over 22 billion tons in reserve. The factors involved in the estimations are discussed.
2. (and Wagner, H. C., and Haley, B. R.). Geology of anthracite in the west-central part of the Mount Carmel Quadrangle [Northumberland Co], Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 3 (3 sheets). Scale 1:6,000 (1 inch to 500 feet), text and cross sections, 1950. A coal outcrop map, a structure map of the Buck Mountain coal, and cross sections are followed by a very cursory description of the various coal beds.
3. (and others). Geology of anthracite in the east-central part of the Mount Carmel Quadrangle [Columbia, Northumberland Cos.], Pennsylvania: U. S. Geol. Survey Coal Inv. May C 10 (3 sheets). Scale 1:6,000 (1 inch to 500 feet), with sections and text, 1951. A short text, with cross sections showing the complex structure, is preceded by a coal outcrop map and a structure contour map of the Buck Mountain coal bed.
4. (and others). Geology of anthracite in the southwestern part of the Mount Carmel Quadrangle [Northumberland Co.], Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 7 (3 sheets). Scale 1:6,000 (1 inch to 500 feet), with sections and text, 1951. A short text, describing the various coal beds, is preceded by a coal outcrop map and a structure map of the Buck Mountain and Mammoth coal beds. Cross sections show the complex structure.
5. (and others). Geology of anthracite in the southeastern part of the Mount Carmel Quadrangle [Columbia, Northumberland, Schuylkill Cos.], Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 12 (3 sheets). Scale 1:6,000 (1 inch to 500 feet), with cross sections and text, 1953. Cross sections show the complex, faulted syncline that is present. A brief text includes descriptions of individual coal beds.

ROWE, R. B., *see* Schuchert, C., 6.

ROY, RUSTUM

1. (and Francis, E. E.). On the distinction of sillimanite from mullite by infra-red techniques: Am. Mineralogist, v. 38, p. 725-728, illus., 1953. A sillimanite sample from Delaware Co. is used with others in an experiment to demonstrate a technique.

RUBEY, WILLIAM WALDEN

1. Charles Kenneth Leith (1875-1956): Am. Phil. Soc. Yearbook 1957, p. 133-137, 1958.

RUBIN, MEYER, *see also* Droste, J. B., 6.

1. (and Alexander, C.). U. S. Geol. Survey radiocarbon dates, [Pt.] 4: Science, v. 127, p. 1476-1487, 1958. Peat and marl from a bog near Corry, Erie Co., are about 14,000 years old.

RUEDEMANN, RUDOLF, 1864-1956.

1. On the symmetric arrangement in the elements of the Paleozoic platform of North America: N. Y. State Mus. Bull. 140, p. 141-149, illus., 1910; condensed, Am. Jour. Sci. 4th ser., v. 30, p. 403-411, illus., 1910. A generalized discussion of Paleozoic tectonic and sedimentary features of the eastern United States includes those of the Commonwealth. No details are included.
2. General geology of North America, *in* Geologie der Erde, E. Krenkel, ed., North America, v. 1, p. 41-55, illus., Berlin, Gebruder Borntraeger, 1939. A review of the theories of the origin of continents includes illustrations which contain data from the Commonwealth. The permanency of the continents is emphasized. The fundamental shield, or basement complex, is surrounded by geosynclines, of which the Appalachian is one. No details are included.
3. General paleogeography of North America, *in* Geologie der Erde, E. Krenkel, ed., North America, v. 1, p. 72-87, illus., Berlin, Gebruder Borntraeger, 1939. A very generalized review includes the Commonwealth. The Appalachian Geosyncline is considered as a Precambrian feature. The Paleozoic sea invasions are described. No details are included, however.

4. Edward Oscar Ulrich, 1857-1944: Natl. Acad. Sci. Biog. Mem., v. 24, p. 259-280, port., 1947.

RUSH, BENJAMIN, 1746-1813.

1. Experiments and observations on the mineral waters of Philadelphia, Abington, and Bristol [Philadelphia, Bucks Cos.]. 30 p., Philadelphia, James Humphreys, Jr., 1773. This is a cursory description of springs in the region, some of which supposedly have curative powers. Rough analyses are included. The medical claims are riotous.

RUSSELL, EDMUND LOUIS, JR.

1. Stratigraphy and intraformational structures from well cores of the Upper Devonian of the Bradford oil field [McKean Co.]. M. S. thesis, Pa. State Coll., 1951.

RYAN, JOHN DONALD, *see* McLaughlin, D. B., 6.

SALISBURY, ROLLIN D., 1858-1922, *see* Fairchild, H. L., 3; Shaw, E. W., 1.

S[ANDFORD], K[ENNETH] S[TUART]

1. Douglas Wilson Johnson [1878-1944]: Geol. Soc. London Quart. Jour., v. 100, Proc., p. lx-lxi, 1945.

SANDFORD, ROBERT S.

1. (and Lamb, F. D.). Investigation of the Benjamin Franklin graphite mine (government owned) and the Just graphite mine, Chester County, Pa.: U. S. Bur. Mines Rept. Inv. 4530, 17 p. (‡), illus., 1949. Nine trenches and 3 core-drill holes were studied in evaluating the property. Graphite occurs in the Precambrian Pickering Gneiss (1) as an important constituent, evenly disseminated throughout the gneiss, (2) in pegmatites, and (3) in small veins.

SANDFORD, SAMUEL, *see also* Fuller, M. L., 2; Schroeder, F. C., 1.

1. (and Stone, R. W.). Pennsylvania, *in* Useful minerals of the United States: U. S. Geol. Survey Bull. 585, p. 158-164, 1914. A list and a brief reference to location by county of 81 different mineral products are given.

SANDO, WILLIAM JASPER

1. Lower Ordovician section near Chambersburg [Franklin Co.], Pennsylvania: Geol. Soc. America Bull., v. 69, p. 837-854, illus., 1958. The Beekmantown Group is at least 3500 feet thick. The Rockdale Run Formation overlies the Stonehenge Limestone. Sections are described; fossils are listed and illustrated.

SANGREE, ANNE

1. Elevations in Pennsylvania: Pa. Geol. Survey 4th ser., Inf. Circ. 4, 19 p., 1954; Pa. Dept. Internal Affairs Monthly Bull., v. 22, no. 2, p. 9-16, 1954; no. 3, p. 9-16, 27-30, 1954. The elevations of the highest and lowest points of each county, as well as the elevations of some of the major towns and features, are given.

SARDA, GOURI SAUKAR

1. Serpentine deposits of Easton [Northampton Co.], Pennsylvania. . . . M. A. thesis, Columbia Univ., 1950.

SAVAGE, JOHN LUCIAN

1. (and Rhodes, R. F.). Charles Peter Berkey [1867-1955], *in* S. Page. ed., Application of geology to engineering practice, Berkey volume, p. xi-xix, port., New York, Geol. Soc. America, 1950.

SCARPINO, LAWRENCE, *see* Feldman, J., 1.

SCHAEFFER, BOBB

1. A revision of *Coelacanthus newarki* and notes on the evolution of the girdles and basal plates of the median fins in the Coelacanthini: Am. Mus. Novitates 1110, 17 p., illus., 1941. *Osteopleurus newarki* from the Lockatong Formation in Montgomery Co. is described and illustrated.
2. The palaeoniscoid fish *Turseodus* from the Upper Triassic Newark Group [Chester Co.]: Am. Mus. Novitates 1581, 24 p., illus., 1952. A very detailed description, an illustration, and a discussion of *Turseodus acutus* are given. It is from the Lockatong Formation.
3. The Triassic coelacanth fish *Diplurus,* with observations on the evolution of the Coelacanthi: Am. Mus. Nat. Hist. Bull., v. 99, p. 25-78, illus., 1952. A monograph includes detailed redescriptions of *Diplurus longicaudatus* and *D. newarki.* These are found in the Triassic rocks of Montgomery Co.

SCHANZ, JOHN JACOB, JR.

1. Historical statistics of Pennsylvania's mineral industries, 1759-1955: Pa. State Univ. Mineral Industries Exper. Sta. Bull. 69, viii, 94 p., 1957.
2. (and others). Coal resources in Pennsylvania, Ohio, and West Virginia, [Chap.] 8 *of* Future energy sources for Pennsylvania: Pa. State Univ. Mineral Industries Exper. Sta. Circ. 53, p. 93-117, illus., 1958. A cursory description of the northern Appalachian coal field includes that part in the Commonwealth.

SCHARON, HARRY LE ROY

1. (and Cleaves, A. B.). Geophysics on the Pennsylvania Turnpike: Mining Eng., v. 3, p. 351-355, illus., 1951; Am. Inst. Min. Engineers Trans. 1951, v. 190, 1952. Electrical resistivity analyses were made of 245 road cuts and structure sites which were then compared with the actual cases. It is a practical device and can be used to estimate excavation problems.
2. (and Cleaves, A. B.). Geophysical investigations for the Lehigh Tunnel [Carbon, Lehigh Cos.], *in* Symposium on "Geological factors in tunnel construction" . . . : Am. Soc. Civil Eng. Proc., v. 84, Jour. Soil Mechanics and Found. Div. SM. 2, pt. 1, Paper 1650, 11 p., illus., 1958. Electrical resistivity investigations are made at the tunnel portals. The results show that the bedrock is much deeper than had been postulated and that the most desirable areas for the portals are where the bedrock approaches the ground surface. Curves and profiles are included.

SCHEMEL, MART PHILLIP, *see* Cross, A. T., 2.

[SCHERER, P.]

1. A complete list of mineral waters, foreign and domestic with their analyses, uses, and sources. 59 p., New York, P. Scherer and Co., [1882]. Water from many springs is analyzed, including Gettysburg Katalysine Water from Adams Co. It is said to be good for dyspepsia, sickness of the stomach, heartburn, waterbrash, acute neuralgic pains, loss of appetite, chronic diarrhea, torpid liver, gout, chronic rheumatism, nodosites of the joints, approaching and actual paralysis, diabetes, kidney disease, gravel, etc.

SCHIMPER, WILHELM PHILLIP, 1808-1880.

1. Traite de paléontologie vegetale ou la flore du monde primitif. . . . 3 v., 740 p., 968 p., 896 p., illus., Paris, J. B. Bailliere and Sons, 1874. A monograph includes descriptions and illustrations of fossil plants from Silurian-Recent from all over the world, the Commonwealth included. Some are new.

SCHLEGEL, DOROTHY McKENNEY

1. Gem stones of the United States: U. S. Geol. Survey Bull. 1042 G, p. iii, 203-253, tables, 1957. Gem stones and precious stones from the Commonwealth are included. Little detail is given. Most gems are from the southeastern counties.

SCHMIDT, HERMANN

1. Ein Vergleich zwischen deutschem und amerikanischem Devon: Deutsche geol. Gesell. Zeitschr., v. 101, p. 213-219, illus., Hannover, 1950. The similarity between the Devonian deposition of the northern Appalachians, including Pennsylvania, with that of Germany is pointed out. Both are miogeosynclinal with foreland facies. The faunal facies are similar also.

SCHNABEL, ROBERT WAYNE

1. (and Vickers, R. C.). Reconnaissance of the Clinton Formation in . . . Pennsylvania . . . : U. S. Geol. Survey Trace Elem. Inv. 434, 12 p. (‡), illus., 1953. A map shows the 20 tested locations throughout eastern Pennsylvania. The data are given in a table; no concentration of trace elements is detected anywhere.
2. The uranium deposits of the United States: U. S. Geol. Survey Mineral Inv. Resources Appraisals Map MR 2. Scale 1:5,000,000 (about 1 inch to 79 miles), with text, 1955.

SCHNEIDER, ALLAN F.

1. Fauna of the Trenton Limestone near Waddle [Centre Co.], central Pennsylvania. M. S. thesis, Pa. State Coll., 1951.

SCHNEIDER, E. A., *see* Clarke, F. W., 2, 3.

SCHOTTENLOCHER, RUDOLF

1. Die Gebirgsumrahmung des nordamerikanischen Kontinents: Geog. Gesell. Wien Mitth., v. 77, p., 129-145, illus., Vienna, 1934; review by I. O. Brown, Am. Assoc. Petroleum Geologists Bull., v. 20, p. 829-830, 1936. A review of the origin of the various mountain systems in the United States shows that they are all related to our main continental mass and are not coalesced parts of other continental masses. Those of the Commonwealth are included.

SCHRADER, FRANK CHARLES, 1860-1944.

1. (and Stone, R. W., and Sanford, S.). Pennsylvania, *in* Useful minerals of the United States: U. S. Geol. Survey Bull. 624, p. 259-268, 1917. A list and a brief record of the occurrence of over 100 mineral products are given.

SCHRAMM, MARLIN W.

1. Geology of the northeastern part of the Boyertown Quadrangle, Berks County, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1955.

SCHROEDER, JANE C. ARMSTRONG, *see* Armstrong, Jane C.

SCHROYER, JAMES B.

1. A new seismic station in [Greene Co.] western Pennsylvania: Pa. Acad. Sci. Proc., v. 31, p. 100-101, 1957. A seismic station at Waynesburg College is discussed and described.

SCHUCHERT, CHARLES, 1858-1942.

1. On *Syringothyris* Winchell, and its American species [Warren, Crawford, Erie Cos.]: N. Y. State Geologist Ann. Rept., v. 9, p. 28-38, 1890; N. Y. State Mus. Ann. Rept. 43, p. 230-239, 1890 *Syringothyris angulata* from Warren Co., *S. alta* from Crawford Co., and *S. randalli* from Erie and Warren Cos. are described. All are from Devonian rocks.
2. Lower Devonic aspect of the lower Helderberg and Oriskany Formations: Geol. Soc. America Bull., v. 11, p. 241-332, 1900. The Lower Devonian rocks of the Commonwealth are compared faunally and lithologically with those elsewhere in the eastern United States and Europe. The rocks are considered to be Devonian, not Silurian. Fossils are listed.
3. On Siluric and Devonic Cystidea and *Camarocrinus:* Smithson. Misc. Coll., v. 47, p. 201-272, illus., 1904. *Sphaerocystites bloomfieldensis* and *Pseudocrinites claypolei* from Silurian rocks in Perry Co., and *Pseudocrinites elongatus* from Silurian rocks in Bedford Co. are described and illustrated.
4. (and Maynard, T. P.). Brachiopoda [Part 2] *of* Molluscoidea, *in* Systematic paleontology of the Lower Devonian deposits of Maryland: Md. Geol. Survey, Lower Devonian, p. 290-449, illus., 1913. Figures and descriptions of many brachiopods from the Devonian rocks in Bedford Co. are included.
5. Paleogeography of the Devonian: Md. Geol. Survey, Lower Devonian, p. 33-41, illus., 1913. A generalized discussion of Devonian paleogeography includes that of the Commonwealth. Maps are included.
6. (and others). The Lower Devonian deposits of Maryland [and adjacent Pennsylvania]: Md. Geol. Survey, Lower Devonian, p. 69-190, illus., 1913. Detailed descriptions and discussions of Devonian rocks include those from many parts of the Commonwealth.
7. Revision of the Paleozoic Stelleroidea with special reference to North American Asteroidea: U. S. Natl. Mus. Bull., v. 88, 301 p., illus., 1915. This is a monograph on the group. *Devonaster chemungensis* from Devonian rocks in central Pennsylvania is described and illustrated.
8. Thomas Chrowder Chamberlin, 1843-1928: Am. Jour. Sci. 5th ser., v. 17, p. 194-196, 1929.
9. George Perkins Merrill (1854-1929): Smithson. Inst. Ann. Rept. 1930, p. 617-634, port., 1931; Geol. Soc. America Bull., v. 42, p. 95-122, port., 1931.
10. Edward Salisbury Dana [1849-1935]: Am. Jour. Sci. 5th ser., v. 30, p. 161-176, port., 1935; Geol. Soc. America Proc. 1935, p. 201-214, port., 1936.
11. Atlas of paleogeographic maps of North America, xi, 177 p., illus. incl. port., New York, John Wiley and Sons, 1955. Eighty-four small-scale maps show the paleogeography at many different times during geological development of North America. The Commonwealth is included.

SCHULTZ, LEONARD GENE

1. Petrology of underclays [western Pa.]: Geol. Soc. America Bull., v. 69, p. 363-402, illus., 1958. X-ray studies of underclays from many locations, including

some from the Commonwealth, show regional, stratigraphic, and local variations. These are discussed. Underclays are not residual soils on which coal-flora grew.

SCHWEINFURTH, STANLEY PAUL

1. Regional devolatilization of Devonian oil shales of eastern Pennsylvania. M. S. thesis, Univ. Cincinnati, 1953.

SCHWENDINGER, WILLIAM W., *see* Howell, B. F., Jr., 1.

SCOTT, HAROLD WILLIAM, *see also* Swartz, F. M., 7.

1. Memorial to Frank Walbridge DeWolf (1881-1957): Geol. Soc. America Proc. 1957, p. 105-108, port., 1958.

SCOTT, JOSEPH (?)

1. A geographic description of Pennsylvania. . . . 146 p., illus., Philadelphia, Robert Cochran, 1806. An early description of the state mentions the presence of various mineral resources. This book is largely historical in nature.

SCUDDER, SAMUEL HUBBARD, 1837-1911.

1. New types of cockroaches from the Carboniferous deposits of the United States: Boston Soc. Nat. Hist. Mem., v. 4, p. 401-416, illus., 1890. *Lithomylacris pauperata* from [Pennsylvanian] rocks in Luzerne Co., near Pittston, is described and illustrated.
2. Revision of the American fossil cockroaches: U. S. Geol. Survey Bull. 124, 176 p., illus., 1895. *Paromylacris* (?) *pluteus* from Pennsylvanian rocks in Luzerne Co. is described and illustrated.

SEAMAN, DAVID MARTIN

1. (and Hamilton, H. V.). Occurrence of polymorphous wurtzite [Allegheny Co.] in western Pennsylvania and eastern Ohio: Am. Mineralogist, v. 35, p. 43-50, illus., 1950. Three wurtzite-type polymorphs of ZnS have been found along shrinkage cracks in clay-ironstone concretions a few feet above the Brush Creek Limestone in Allegheny Co. Two (4H and 6H) are widespread. The geology and mineralogy of the known occurrences are described.

SEARS, PAUL BIGELOW

1. Types of North American pollen profiles: Ecology, v. 16, p. 488-499, illus., 1935. A pollen profile from Bear Meadow, Centre Co., and nineteen others from elsewhere are used to evaluate post-glacial climates.

SEIFERT, WILBUR H.

1. (and Fettke, C. R., and Fairall, V.). Oil and gas field atlas of the Smethport Quadrangle [McKean Co.], Pennsylvania: Pa. Geol. Survey 4th ser., Spec. Bull. 6, illus. 10 maps, text on cover, 1951. Large-scale maps show land boundaries, well locations, oil field boundaries, and other data. One structure-contour map on the Bradford Third Sand is included, as are tables of selected well records.

SELLARDS, ELIAS HOWARD

1. Charles Schuchert [1858-1942]: Am. Assoc. Petroleum Geologists Bull., v. 27, p. 1027-1029, port., 1943.

SELVIG, WALTER ALFRED, *see* Fieldner, A. C., 3.

SESTINI, ALDO

1. William Morris Davis [1850-1934]: Riv. Geog. Italiana Annata 41, p. 60-64, Florence, 1934.

SEYLER, CLARENCE A., *see* McCartney, J. T., 1.

SHADLE, H. W., *see* Griffiths, J. C., 8.

SHAFFNER, MARCHANT NISSLEY

1. Preliminary report, geology and mineral resources of New Florence Quadrangle [Somerset, Cambria, Westmoreland, Indiana Cos.], Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 137, geol. map with text, scale 1 inch to about 1 mile, 1951. A cursory description of the geology of the quadrangle is given. Devonian-Pennsylvanian rocks are described. Coal and natural gas are the chief mineral resources. Clay, limestone, sandstone, and iron are also present.
2. Preliminary report—Geology and mineral resources of Donegal Quadrangle [Fayette, Somerset, Westmoreland Cos.], Pennsylvania: Pa. Geol. Survey 4th ser., Prog. Rept. 141, geol. map with text, scale 1 inch to about 1 mile, 1952. Devonian-Pennsylvanian rocks are present; folds are the main structures.

Coal and natural gas are the main mineral resources; fire clay, shale, sandstone, and limestone are also present.

3. Reserves of Lower Freeport coal in New Florence Quadrangle [Cambria, Indiana, Somerset, Westmoreland Cos.]: Pa. Dept. Internal Affairs Monthly Bull., v. 22, no. 4, p. 11-12, 1954. Over 14 million tons of coal remain in the ground. A previous estimate of over 11 million tons is discussed.
4. Reserves of Upper Freeport and Lower Kittanning coals in New Florence Quadrangle [Cambria, Indiana, Somerset, Westmoreland Cos.]: Pa. Dept. Internal Affairs Monthly Bull., v. 22, no. 3, p. 23-25, 1954. The Upper Freeport coal holds over 78 million tons in reserve, and the Lower Kittanning coal has over 95 million tons remaining.
5. Geology and mineral resources of the New Florence Quadrangle [Cambria, Indiana, Somerset, Westmoreland Cos.], Pennsylvania: Pa. Geol. Survey 4th ser., Atlas A 57, viii, 165 p., illus. incl. geol. map, 1958. The area is completely described. Devonian-Pennsylvanian, and Pleistocene rocks are mapped. Coal, gas, clay, shale, limestone, sandstone, sand and gravel, iron, and ground water are the mineral resources described.

SHANNON, —, *see* Smeltzer, B. L., 1.

SHAPIRO, NORMAN

1. Petrographic studies of Lower Kittanning [coal ?]. Ph.D. thesis, W. Va. Univ., 1955; (and Cross, A. T.). [abs.]: Econ. Geology, v. 50, p. 790, 1955; Geol. Soc. America Bull., v. 66, p. 1611, 1955.

SHARP, HENRY STAATS

1. Armin Kohl Lobeck [1886-1958]: Geog. Review, v. 48, p. 584-585, 1958.

SHARP, ROBERT PHILLIP, *see* Campbell, I., 2.

SHARPE, DANIEL

1. Report on the fossil remains of Mollusca from the Palaeozoic formations of the United States . . . : Geol. Soc. London Quart. Jour., v. 4, p. 145-181, 1848. Many fossils collected by Lyell on his journeys are identified. None are new or described; some are from lower Paleozoic rocks of the Commonwealth.

SHAW, EUGENE WESLEY, 1881-1935.

1. System of Quaternary lakes in the Mississippi Basin [Allegheny Co.] [abs.]: Geol. Soc. America Bull., v. 22, p. 732, 1911; discussion by R. D. Salisbury, reply by author, p. 732-733.
2. Memorial of Joseph William Winthrop Spencer [1851-1921]: Geol. Soc. America Bull., v. 35, p. 25-37, port., 1924.

SHEAFER, PETER WENRICH, 1819-?, *see also* Northwestern Pa. Oil and Coal Co., 1.

1. The coal fields of McKean County, Pennsylvania. [Report on the Silver Hill Coal and Iron Estate . . .]. 12 p., Philadelphia, Ashmead, 1856. Bituminous coal, cannel coal, fire clay, iron ore, limestone, and bituminous shale are all present in Sergeant Township. An effort is made to justify mining activity.
2. Official coal, iron, railroad and canal map of Pennsylvania, etc., showing the relative position of the various anthracite and bituminous coal fields, etc., by authority of the Legislature of Pennsylvania. Pottsville, Pennsylvania, 1864. [not seen]
3. Report upon the lands of the Preston Coal and Improvement Company in Schuylkill Co., Pa., *in* [Moorehead, William G.] [Prospectus of] Preston Coal and Improvement Co., p. 13-26, illus., Philadelphia, King and Baird, 1864. Anthracite coal is evaluated in this report for a prospectus.
4. The anthracite coal fields of [northeastern] Pennsylvania and their exhaustion. 10 p., illus., Pottsville, [priv. pub] [? 1878]. This is a general survey of the occurrence of anthracite coal in the [Pennsylvanian] rocks. A discussion of the structure of the basins is included. Only 26 billion tons remain.

SHEAFER, WILLIAM L., 2d

1. A study of cyclical sedimentation of the lower Conemaugh Group in the northeast Pittsburgh area [Allegheny Co.]. M. S. thesis, Univ. Pittsburgh, 1950.

SHEPARD, CHARLES UPHAM, 1804-1886.

1. Specific gravities of two meteoric irons, no. 6 *of* On meteorites: Am. Jour. Sci. 2d ser., v. 11, p. 40, 1851. The Allegheny Co. meteorite has a specific gravity of 7.380.

SHEPHERD, FORREST

1. Reports of Professor F. Shepherd . . . and other mining geologists on the Broad Top Mountain coal and iron lands in Huntingdon and Bedford Counties, Pennsylvania. 38 p., illus., New York, J. W. Amerman, 1864. A prospectus includes extracts of the reports of others as well as this one. The coal and iron beds are described; no emphasis is placed upon stratigraphy.

SHEPPARD, RICHARD A.

1. A systematic joint study in the folded Appalachians [Dauphin, Lebanon Cos.]: Pa. Acad. Sci. Proc., v. 30, p. 142-145, illus., 1956. Joints from two different traverses were measured and plotted. It was determined that: (1) lithology does not play an important role in the formation of joints, (2) after the rotation of the bedding to horizontal, no joint-set correlation was obtained, showing that the jointing came after the folding, and (3) shear joints are absent in this area; the dip and strike joints indicate that their formation came shortly after the folding.

SHEPPS, VINCENT CHESTER, *see also* White, G. W., 2.

1. The glacial geology of a part of northwestern Pennsylvania. Ph.D. thesis, Univ. Ill., 1955; [abs.], Dissert. Abs., v. 15, p. 1832-1833, 1955.
2. Field trip A, The glacial geology of Crawford and Erie Counties, *in* Field Conf. of Pa. Geologists 24th, Titusville 1959, p. 2-11 (‡), illus., [n. p.] [1959]. A sketch geological map and a stratigraphic section are followed by a detailed, annotated road log. Various glacial features are visited.
3. (and others). Glacial geology of northwestern Pennsylvania: Pa. Geol. Survey 4th ser., Bull. G 32, iv, 59 p., illus. incl. geol. map, 1959. A study of the character, distribution, and history of the glacial deposits is given. Analyses of tills are included as textural graphs. The deposits are of Illinoisian and Wisconsin age. Sand and gravel, clay, and ground water are discussed as economic products.
4. Glacial geology of northwestern Pennsylvania, *in* Geol. Soc. America Guidebook for field trips . . . , p. 167-188, illus., 1959. A detailed road log with sketch maps is given for a trip visiting glacial geology exposures. Lake Edmund and Lake Watts are discussed.

SHERRILL, RICHARD ELLIS, 1899-1952, *see also* Ingham, A. I., 3.

1. (and others). Tour III, Chestnut Ridge Anticline [Washington, Greene, Fayette Cos.], *in* Field Conf. of Pa. Geologists 19th, Pittsburgh 1950, p. 37-47 (‡), illus., [n. p.] [1950]. This is a detailed road log to visit exposures of Devonian-Permian rocks southward along the Monongahela River to Masontown and then eastward to east of Uniontown. A section is measured.

SHIMER, HERVEY WOODBURN, *see also* Grabau, A. W., 1.

1. Memorial of Frederick Burritt Peck [1860-1925]: Geol. Soc. America Bull., v. 37, p. 111-114, port., 1926.
2. Correlation chart of geologic formations of North America: Geol. Soc. America Bull., v. 45, p. 909-936, illus., 1934. Correlation charts of all of the Paleozoic-Mesozoic-Cenozoic formations in North America include those of the Commonwealth. A little text discussion of some of the correlation problems is included.
3. Henry Fairfield Osborn (1857-1935): Am. Acad. Arts and Science Proc., v. 72, p. 377-379, 1938.
4. (and Shrock, R. R.). Index fossils of North America. ix, 837 p., illus., New York, John Wiley and Sons [1944]; 4th printing 1949; corrections with title, Corringenda for Index fossils of North America, Jour. Paleontology, v. 21, p. 494-498, 1947. Many invertebrate species from the Commonwealth are illustrated and described.
5. Amadeus William Grabau [1870-1946], an appreciation: Am. Jour. Sci., v. 244, p. 735-736, 1946.

SHOEMACHER, HENRY W.

1. Penn's grandest cavern, the history, legends, and descriptions of Penn's Cave in Centre County, Pennsylvania. 94 p., illus., Altoona, Altoona Tribune Press, 1916. This is a popular, abundantly illustrated description of a famous cave.

SHRIBER, ROBERT C.

1. Report on the estate of L. H. Simpson and Co., located in Cameron County

. . . . 10 p., illus., New York, C. S. Westcott and Co., 1866. A report for a prospectus describes the occurrences of bituminous coal.

SHROCK, ROBERT RAKES, *see* Shimer, H. W., 4.

SHURIG, DONALD G.

1. (and Yoder, E. J.). Experience with core drilling machines, power augers, and electrical resistivity on the Pennsylvania Turnpike: Am. Soc. Testing Materials Spec. Tech. Pub. 239, p. 26-44, illus., 1959; discussions, p. 44-45. Examples of the interplay of geological engineering tools are taken from the problems encountered in working on the Turnpike. Comparisons of various methods are made. They are more efficient when used in conjunction with each other than when used alone.

SHUTTLEWORTH, JOHN

1. Report of an examination of the estate of the Lycoming and Jackson Land and Coal Company. 23 p., New York, John Gray, 1834. The property, along Lycoming Creek in Lycoming Co., is described. Bituminous coal and iron ore are present. Little geological description is included.

SILLIMAN, BENJAMIN, SR., 1779-1864.

1. Report on the coal formation of the valleys of Wyoming and Lackawanna, to which are added miscellaneous remarks and communications. 29 p., illus., New Haven, H. Howe, 1830. [not seen]

SILLIMAN, BENJAMIN, JR., 1816-1885.

1. Description and analyses of several American minerals: Am. Jour. Sci. 2d ser., v. 8, p. 377-394, 1849. Emerylite, corundellite, euphyllite, and unionite from Chester Co. are analyzed. Bucholzite from Chester Co. is considered to be kyanite; indianites from Chester and Lancaster Cos. are also described and analyzed and are found to be anorthite.
2. Memoir of John Lawrence Smith, 1818-1883: Natl. Acad. Sci. Biog. Mem., v. 2, p. 217-248, 1886.

SIMMONS, ARTHUR CARLISLE

1. Dr. Charles R[einhard] Fettke [1888-1952] dies in Pennsylvania: Producers Monthly, v. 23, no. 8. p. 17, port., 1959.

SIMPSON, GEORGE GAYLORD

1. Large Pleistocene felines of North America: Am. Mus. Novitates 1136, 27 p., illus., 1941. Part of a lower jaw of a puma, *Felis inexpectata* from the Port Kennedy Cave Pleistocene fauna in Montgomery Co., is discussed.
2. Notes on Pleistocene and Recent tapirs: Am. Mus. Nat. Hist. Bull., v. 86, p. 33-82, illus., 1945. *Tapirus copei* from the Port Kennedy Cave in Montgomery Co. is described and illustrated.

SINGEWALD, JOSEPH THEOPHILUS, JR.

1. George Martin Hall (1891-1941): Am. Assoc. Petroleum Geologists Bull., v. 25, p. 1828-1830, port., 1941; Geol. Soc. America Proc. 1941, p. 173-176, port., 1942.
2. Memorial to Charles Kephart Swartz [1861-1949]: Geol. Soc. America Proc. 1950, p. 131-134, port., 1951.
3. Memorial to David Bright Reger (1882-1958): Geol. Soc. America Proc. 1958, p. 179-182, port., 1959.

SINKANKAS, JOHN

1. Gemstones of North America. xv, 675 p., illus., Princeton, N. J., D. Van Nostrand Co., 1959. Gems are discussed, splendidly illustrated, and described. A geographical index is included. All gems from the Commonwealth come from the crystalline rocks of the southeastern counties with one exception; pyrite occurs in Luzerne Co.

SITLER, ROBERT FRANCIS, *see also* Shepps, V. C. 3; White, G. W., 2.

1. (and Chapman, C. A.). Microfabrics of till from Ohio and [Erie, Crawford, Lawrence Cos.] Pennsylvania: Jour. Sed. Petrology, v. 25, p. 262-269, illus., 1955. Oriented thin sections of Wisconsin till show microfoliation, coarse fragment orientation, and veining. Each fabric is described, and the origin of the microfabrics is considered.
2. Petrography of the Wisconsin tills of northeastern Ohio and northwestern Pennsylvania. M. S. thesis, Univ. Ill., 1955.
3. Petrography of Wisconsin tills in oriented sections [northwestern Pa.] [abs.]: Geol. Soc. America Bull., v. 68, p. 1900, 1957.

4. Glacial geology of part of western Pennsylvania [abs.]: Dissert. Abs., v. 18, p. 561, 1958.

SMALL, WALTER M.

1. Is there more oil in Titusville? Oil and Gas Jour., v. 57, no. 33, p. 144-148, illus., 1959. A brief survey of the generalized geology of northwestern Pennsylvania and a discussion of the future petroleum potential of the area are given.

SMELTZER, BERNARD L., *see also* Hartman, F., 3.

1. (and Shannon, —). Millheim Cave . . . Centre Co. . . . : Nittany Grotto Newsletter, v. 2, no. 3, p. 5 (‡), illus., 1953. A brief description of the cave includes a sketch map.
2. Rupert Cave . . . Mifflin Co. . . .: Nittany Grotto Newlsetter, v. 2, no. 1, p. 11-12 (‡), illus., 1953. A description of the cave includes a sketch map.
3. (and Stone, R. W.). Many new caves found in southeastern Pennsylvania: Pa. Dept. Internal Affairs Monthly Bull., v. 24, no. 5, p. 1-5, 21-28, illus., 1956. Caves, large and small, are briefly described. Maps of Hershey Cave in Cumberland Co. and Woodchuck Cave in Franklin Co. are included.
4. Additional data on Shippensburg [Cumberland, Franklin Cos.] caves: MAR Bull. 4, p. 2- [17] (‡), illus., 1958. Numerous caves in the Franklin-Cumberland Co. area around Shippensburg are described and mapped. Most of them are in Cumberland Co.
5. Needy Cave, Franklin Co.: Netherworld News, v. 6, p. 290-291 (‡), illus., 1958; Speleo Digest 1958, pt. 1, p. 1-74 - 1-77 ((‡), illus., 1959. The cave in Cambrian limestone is described. A detailed sketch map is included.

SMITH, B. H., *see* Haywood, J. K., 1.

SMITH, BURNETT

1. Memorial to Harry Nelson Eaton [1880-1944]: Geol. Soc. America Proc. 1944, p. 181-184, port., 1945.

SMITH, GEORGE G., JR.

1. Good Cave, Venango County: Nittany Grotto Newsletter, v. 7, p. 122 (‡), illus., 1959. A joint cave in sandstone is described; a sketch map is included.

SMITH, GEORGE OTIS, 1871-1944.

1. Joseph Silas Diller [1850-1928]—an appreciation: Eng. Min. Jour., v. 126, p. 913, 1928.

SMITH, GUY-HAROLD

1. Armin Kohl Lobeck, geomorphologist and landscape artist, 1886-1958: Assoc. Am. Geographers Annals, v. 49, p. 83-87, port., 1959.

SMITH, HAROLD THEODORE UHR

1. The Hickory Run boulder field, Carbon County, Pennsylvania: Am. Jour. Sci., v. 251, p. 625-642, illus., 1953. Periglacial conditions caused frost-wedged blocks to fill a valley. After the ice retreated and stream action was resumed, the fine interstitial material was carried away, leaving a boulder field in the valley.

SMITH, HORACE J.

1. Map of the oil regions of western Pennsylvania and portions of . . . Ohio, New York and West Virginia. Scale, 1 inch to about 6 miles, Philadelphia, [n. d.].

SMITH, ISABEL F.

1. Anorthosite in the Piedmont Province of [southeastern] Pennsylvania. Ph.D. thesis, Bryn Mawr Coll., 1922.

SMITH, JAMES PERRIN, 1864-1931.

1. John Casper Branner [1850-1922]: Jour. Geology, v. 32, p. 240-241, 1924.

SMITH, LLOYD BEECHER

1. Peculiar jointage caused by a peridotite dike in Fayette County, Pennsylvania. M. S. thesis, Pa. State Coll., 1913.

SMITH, WILLIAM H., *see* Cross, A. T., 1.

SNYDER, N. H.

1. (and Swingle, R. J.). Analyses of Pennsylvania bituminous coals . . . supplement to [U. S. Bur. Mines] Technical Paper 590: U. S. Bur. Mines Tech. Paper 645, 19 p., 1942.
2. (and Aresco, S. J.). Analyses of tipple and delivered samples of coal (collected during the fiscal years 1948 to 1950, inclusive): U. S. Bur. Mines Bull.

516, 133 p., 1953. Proximate and ultimate analyses of Pennsylvania anthracite and bituminous coals are included.

SOCOLOW, ARTHUR ABRAHAM, *see also* Gray, C., 13.

1. Geologic interpretation of aeromagnetic map, Allentown [7½′] Quadrangle [Lehigh, Northampton Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 28, 7 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 213 are geologically interpreted. Magnetic anomalies are correlated with lithologic variation.
2. Geologic interpretation of aeromagnetic map, Buckingham, Lambertville and Stockton [7½′] Quadrangles [Bucks Co.]: Pa. Geol. Survey 4th ser., Inf. Circ. 30, 5 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Maps 215 and 216 are given geological interpretations. Magnetic anomalies are correlated with lithologic variations.
3. Geologic interpretation of aeromagnetic map, Conestoga [7½′] Quadrangle [Lancaster Co.]: Pa. Geol. Survey 4th ser., Inf. Circ. 32, 4 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 218 are given geological interpretation. Magnetic anomalies are correlated with lithologic variation.
4. Geologic interpretation of aeromagnetic map, East Greenville [7½′] Quadrangle [Berks, Lehigh, Montgomery Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 23, 7 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 205 are given geological interpretations. Magnetic anomalies are correlated with lithologic variation.
5. Geologic interpretation of aeromagnetic map, Elverson [7½′] Quadrangle [Berks, Chester Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 35, 5 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 221 are given geological interpretations. Magnetic anomalies are correlated with lithological variations.
6. Geologic interpretation of aeromagnetic map, Malvern [7½′] Quadrangle [Chester Co.]: Pa. Geol. Survey 4th ser., Inf. Circ. 20, 4 p., 1959. Distinctive features on U. S. Geol. Survey Geophys. Inv. Map 202 are given geological explanations. Magnetic anomalies are correlated with lithologic variations.
7. Geologic interpretation of aeromagnetic map, Media [7½′] Quadrangle [Chester, Delaware Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 22, 4 p., 1959. Distinctive features on U. S. Geol. Survey Geophys. Inv. Map 204 are given geological explanations. Magnetic anomalies are correlated with lithologic variations.
8. Geologic interpretation of aeromagnetic map, Milford Square [7½′] Quadrangle [Bucks, Lehigh, Montgomery Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 24, 4 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 206 are given geological interpretations. Magnetic anomalies are correlated with lithologic variations.
9. Geologic interpretation of aeromagnetic map, Morgantown [7½′] Quadrangle [Berks, Lancaster Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 34, 4 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 220 are given geological interpretations. Magnetic anomalies are correlated with lithologic variations. The Grace magnetite mine is easily identifiable.
10. Geologic interpretation of aeromagnetic map, Norristown [7½′] Quadrangle [Delaware, Montgomery Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 19, 3 p., 1959. Distinctive features on U. S. Geol. Survey Geophys. Inv. Map 201 are given geological explanations. Magnetic anomalies are correlated with lithologic variations.
11. Geologic interpretation of aeromagnetic map, Perkiomenville [7½′] Quadrangle [Bucks, Montgomery Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 26, 4 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 208 are given geological interpretations. Magnetic anomalies are correlated with lithologic variations.
12. Geologic interpretation of aeromagnetic map, Phoenixville [7½′] Quadrangle [Chester, Montgomery Cos.]: Pa. Geol. Survey 4th ser.. Inf. Circ. 27, 3 p., 1959. U. S. Geol. Survey Geophys. Inv. Map 209 shows no distinctive anomalies, indicating that the lithology is relatively uniform over the map area.
13. Geologic interpretation of aeromagnetic map. Quakertown [7½′] Quadrangle [Bucks Co.]: Pa. Geol. Survey 4th ser., Inf. Circ. 29, 4 p., 1959. Distinctive

features of U. S. Geol. Survey Geophys. Inv. Map 214 are given geological interpretations. The magnetic anomalies are correlated with lithological variations.

14. Geologic interpretation af aeromagnetic map, Quarryville [7½′] Quadrangle [Lancaster Co.]: Pa. Geol. Survey 4th ser., Inf. Circ. 33, 4 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 219 are given geological interpretations. Magnetic anomalies are correlated with lithologic variations.
15. Geologic interpretation of aeromagnetic map, Safe Harbor [7½′] Quadrangle [Lancaster, York Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 31, 4 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 217 are given geological interpretation. Magnetic anomalies are correlated with lithologic variation.
16. Geologic interpretation of aeromagnetic map, Sassamansville [7½′] Quadrangle [Berks, Montgomery Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 25, 4 p., 1959. Distinctive features of U. S. Geol. Survey Geophys. Inv. Map 207 are given geological interpretation. Magnetic anomalies are correlated with lithologic variation.
17. Geologic interpretation of aeromagnetic map, Valley Forge [7½′] Quadrangle [Delaware, Chester, Montgomery Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 18, 4 p., 1959. Distinctive features on U. S. Geol. Survey Geophys. Inv. Map 200 are given geologic explanations. Magnetic anomalies are correlated with lithologic variation.
18. Geologic interpretation of aeromagnetic map, West Chester [7½′] Quadrangle [Chester, Delaware Cos.]: Pa. Geol. Survey 4th ser., Inf. Circ. 21, 4 p., 1959. Distinctive features on U. S. Geol. Survey Geophys. Inv. Map 203 are given geological explanations. Magnetic anomalies are correlated with lithologic variation.
19. Geology of a barite occurrence, Fulton County, Pennsylvania: Pa. Acad. Sci. Proc., v. 33, p. 204-208, illus., 1959; reprinted *as* Pa. Geol. Survey 4th ser., Inf. Circ. 17, 1959. Barite-bearing solutions came along a fault zone near Ft. Littleton and replaced limestone. The paragenesis is described.
20. Magnetic patterns over Triassic diabase in [southeastern] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1678, 1959.

SOREN, JULIAN, *see* Wood, G. H., Jr., 1, 2.

SPENCER, ARTHUR COE

1. Memorial to Edwin Clarence Eckel [1875-1941]: Geol. Soc. America Proc. 1942, p. 179-187, port., 1943.

SPENCER, GRAHAM

1. The kaolin beds of Chester County, Pa. . . .: Engineers Club Philadelphia Proc., v. 4, p. 302-305, 1885; Sci. Am. Supplement, v. 31, p. 12, 842, 1891. A description of the deposit and discussion of the origin of the Chester Co. kaolin are given. It occurs in oblong pockets, or lenses, resulting from the decomposition of a feldspar-bearing rock. There are no surface indications.

SPENCER, JOSEPH WILLIAM WINTHROP, 1852-1921, *see also* Fairchild, H. L., 3.

1. [Geological history in the Great Lakes area] [abs.]: Am. Geologist, v. 2, p. 346-348, 1888; Science, v. 12, p. 99-100, 1888; Canadian Record Sci. 3d ser., v. 3, p. 232-235, 1888; Am. Assoc. Adv. Sci. Proc., v. 37, p. 197-199, 1889; Am. Naturalist, v. 23, p. 491-494, 1889

SPERRY, E. S., *see* Penfield, S. L., 1.

SPICER, HERBERT CECIL

1. Rock temperatures and depths to normal boiling points of water in the United States: Am. Assoc. Petroleum Geologists Bull., v. 20, p. 270-279, 1936. A table shows the highest and lowest extrapolated temperatures in the earth at 2 given depths for a number of localities, including some in the Commonwealth. Computed maximum and minimum depths to 212°F are also given for each locality.

SPIEKER, EDMUND MAUTE

1. Mountain-building chronology and nature of the geologic time scale: Am. Assoc. Petroleum Geologists Bull., v. 40, p. 1769-1815, illus., 1956; [summary], Tulsa Geol. Soc. Digest, v. 19, p. 57-59, 1951. In a generalized discussion of

methods of the dating of orogenic events, the Appalachian Revolution effects in Pennsylvania are used as examples.

SPITTAL, HUGH E., *see* Murphy, R. E., 1.

SPRUNK, GEORGE CARL, *see also* Theissen, R., 3.

1. (and Thiessen R.), Spores of certain American coals: Fuel, v. 11, p. 360-370, illus., London, 1932. Spore types and percentages in many different coals are described and illustrated. Some are from the bituminous coals in the Commonwealth. The spores are described physically but not named.

STADNICHENKO, TAISIA MAXIMOVNA, 1894-1958.

1. Accumulation of minor elements in coal ash and its economic implications [abs.]: Econ. Geology, v. 48, p. 332, 1953.
2. (and others). Concentration of germanium in the ash of American coals—a progress report: U. S. Geol. Survey Circ. 272, iii, 34 p., illus., 1953. Coal, as a source of germanium, is studied from many places in the U. S., including the Commonwealth. Most of the samples are from the western coal fields but a few are from the anthracite region. The data are in tabular form.

STANTON, GILMAN S.

1. Louis Pope Gratacap [1850-1917]: Am. Mineralogist, v. 3, p. 31-33, 1918.

STANTON, TIMOTHY WILLIAM, 1860-1953.

1. [Charles] David White [1862-1935]: Jour. Geology, v. 43, p. 778-780, 1935.

STAUFFER, CLINTON RAYMOND

1. Memorial of John Adams Bownocker [1865-1928]: Geol. Soc. America Bull., v. 40, p. 17-22, port., 1929.

STEIGER, GEORGE, 1869-1944.

1. Note on the analysis of water from a deep well in [Washington Co.] Pennsylvania: Wash. Acad. Sci. Jour., v. 3, p. 423-424, 1913. Water from 6300 feet below the surface is analyzed and found to be eight times as saline as ocean water. It is not unusually saline for connate water, however.

STELLMACK, J.

1. Deer Bone Cave (Ellenberger Cave) . . . Centre County, Pa.: Speleo Digest 1958, pt. 1, p. 1-1 - 1-3 (‡), illus., 1959; reprinted *from* Nittany Grotto Newsletter, v. 6, no. 5, 1958. A brief description and a sketch map are given.
2. Elk Creek Cave . . . Centre County, Pa.: Speleo Digest 1958, pt. 1, p. 1-4 - 1-5 (‡), illus., 1959; reprinted *from* Nittany Grotto Newsletter, v. 6, no. 5, 1958. A sketch map and a brief description are given.

STEPHENSON, ROBERT CHARLES

1. Non-metallic mineral resources of Pennsylvania: Pa. Acad. Sci. Proc., v. 24, p. 215-219, 1950; Pa. Dept. Internal Affairs Monthly Bull., v. 18, no. 10, p. 7-10, 1950. This is a generalized review of some of the major industrial-mineral occurrences. Cement, stone, clay, slate, glass sand, and others are briefly discussed. No new data or reserve figures are included.
2. Industrial minerals in Pennsylvania in 1951: Pa. Geol. Survey 4th ser., Inf. Circ. 2, 6 p., 1952. A brief survey of the various products is given. No new geologic data are included, however.

STERN, THOMAS WHITAL

1. (and others). Lead-isotope age studies in Carbon County, Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1680-1681, table, 1959.

STERNBERG, KASPAR MARIA VON, 1761-1838.

1. Versuch einer Geognostischen-botanischen Darstellung der Flora der Vorwelt [Parts 5 and 6]. 220 p., illus., Prague, Gottleib Haase and Sons, 1838. A review of then-current paleobotanical works includes descriptions of plants from Pennsylvanian rocks in the Commonwealth. A few are illustrated; none are new.

STETSON, HENRY CROSBY, 1900-1955.

1. Memorial to Percy Edward Raymond (1879-1952): Geol. Soc. America Proc. 1952, p. 121-126, port., 1953.

STEVENS, RICHARD P.

1. On the past and future topography of the United States: Am. Geog. and Stat. Soc. Proc., v. 1, p. 71-83, illus., 1863. Ancient beach ridges are recognized around the Great Lakes and elsewhere. The sea is hypothesized to have caused them. The paleogeography of the eastern United States, including the

Commonwealth, is described assuming these ridges are at sea level. The Susquehanna River would drain Lake Ontario.

STEVENSON, JOHN JAMES, 1841-1924.

1. Notes on the geology of West Virginia: Am. Phil. Soc. Trans. new ser., v. 15, p. 15-32, 1881. A description of the Mississippian-Permian rocks in northwestern West Virginia includes numerous references to exposures in the Commonwealth.

STEVENSON, ROBERT E., *see* Willard, B., 5.

STEWART, D. SHRIVER

1. Description of a large private estate . . . mineral, timber, and agricultural lands . . . southwestern Pennsylvania to which is appended a geological report of the mineral townships in Fayette County, Pa. 22 p., illus., Washington, D. C., Powell and Ginck, [n. d.]. [post 1878] A sale of what is made to sound like Valhalla in Pennsylvania includes a description of the stratigraphy and mineral resources. Coal and iron are the chief products.

STEWART, P. R., *see* Sherrill, R. E., 1.

STEWART, ROBERT H.

1. Radiometric reconnaissance examination in southeastern Pennsylvania . . . : U. S. Geol. Survey Trace Elem. Memo. 255, 13 p. (‡), illus., 1951. Numerous outcrops in Bucks and Northampton Cos. were examined, sampled, and tested with a radioactivity counter. The results are included in a table. Radioactivity is above average in the area.

STIEFF, LORIN ROLLINS, *see* Stern, T. W., 1.

STILLE, HANS W.

1. Einfuehrung in den Bau Amerikas. xx, 717 p., illus.. Berlin, Gebrueder Borntraeger, 1940. A review of the structural geology of North America includes that of the Commonwealth. No new data are included.

STINGELIN, RONALD WERNER

1. Phyto-geologic relationship in the vicinity of Bethlehem [Northampton Co.], Pennsylvania. M. S. thesis, Lehigh Univ., 1959.

STOEK, HARRY HARKNESS, 1866-1923.

1. Geology, mining, and preparation of anthracite: Western Soc. Engineers Jour., v. 17, p. 705-710, illus., 1912; discussions, p. 710-724. A description of the mining and milling procedures in the anthracite fields is preceded by a brief, generalized review of the geology of the area.

STONE, RALPH WALTER, *see also* Dunn, J. R., 4; Mohr, C. E., 1; Sanford, S., 1; Schroeder, F. C., 1; Smeltzer, B. L., 3.

1. Stratigraphy, *in* Review of general geology of southwestern Pennsylvania: Pa. Topog. Geol. Survey [3d ser.] Rept. 1906-08, p. 128-189, illus., 1908. [Pennsylvanian]-Permian formations are described in very fine detail. Sections are measured; correlations are made.
2. Memorial to George Hall Ashley [1866-1951]: Geol. Soc. America Proc. 1951, p. 85-95, port., 1952.
3. Commercial caves of Pennsylvania: Natl. Speleol. Soc. Bull. 15, p. 39-50, illus., 1953. Eleven commercial caves are described and illustrated. Four others are present but are no longer active.
4. Descriptions of Pennsylvania's undeveloped caves: Natl. Speleol. Soc. Bull. 15, p. 51-137, illus., 1953; addition by Nittany Grotto with title, New Caves and extensions . . .: Nittany Grotto Newsletter, v. 6, p. 77-136 (‡), illus., 1958. Caves are listed by county and are briefly described. Some are illustrated. An index map is included. Sketch maps accompany all of the caves listed in the addition.
5. Limestone mines: Natl. Speleol. Soc. Bull. 15, p. 38, 1953. Many places where limestone is valuable enough to be mined underground are mentioned.
6. Pennsylvania caves: Pa. Acad. Sci. Proc., v. 27, p. 167-168, 1953. Practically all of them are in limestone, Centre Co. having the most known (30). Of all those in the Commonwealth, 40 percent are in hills, and 60 percent are in valleys. Seventy percent are in gently-dipping beds, and 30 percent in steeply-dipping beds. Most of them are in Cambrian-Devonian rocks. Other statistical data are included.
7. Stanley Holman Cathcart (1889-1953): State Geologists Jour., v. 5, no. 2, p. 9-10, 1953.

STORM, PAUL JENNINGS

1. Evidences of sedimentation rhythms in the Shenandoah Limestone near Ivy Rock, Montgomery County, Pennsylvania. M. S. thesis, Univ. Pa., 1926.

STOSE, ANNA ISABEL JONAS, *see* Jonas, A. I.

STOSE, GEORGE WILLIS, *see also* Jonas, A. I., 1.

1. (and Jonas, A. I.). Geology and mineral resources of York County, Pa.: Pa. Geol. Survey 4th ser., Bull. C-67, v, 199 p., illus. incl. geol. map, 1939. A complete geologic description of the area is given. Precambrian-Ordovician, Triassic, and Tertiary rocks are mapped. The structure is extremely complex. Limestone, slate, clay, sand, stone, iron ore, copper, and garnet are the mineral resources discussed.
2. Comments on the Taconic sequence in [southeastern] Pennsylvania: Geol. Soc. America Bull., v. 61, p. 133-135, illus. incl. geol. map, 1950. Shale previously considered to be Ordovician Martinsburg occurring in the Great Valley from Hummelstown, Dauphin Co., to Shepherdstown, Cumberland Co., is considered to be part of the Taconic Sequence. Field evidence is evaluated.
3. Evidence of the Taconic sequence in the vicinity of Lehigh River, [Lehigh Co.], Pennsylvania: Am. Jour. Sci., v. 248, p. 815-819, illus., 1950. Shales and sandstones on limestone, south of First Mountain in the Great Valley, are interpreted as a klippe of Taconic Sequence sedimentary rocks.
4. Geology of the Carlisle Quadrangle [York, Adams, Cumberland Cos.], Pennsylvania: U. S. Geol. Survey Geol. Quad. Map GQ 28, scale 1:62,500 (about 1 inch to 1 mile), with text, 1953. A complete geologic description of the area is given. Precambrian-Ordovician and Triassic rocks are mapped. The complex structure is briefly described. Iron ore and clay are the chief mineral resources. Manganese is also present.

STOUT, WILBER ELIHU

1. (and Lamb, G. F.). Physiographic features of southeastern Ohio [and western Pa.]: Ohio Jour. Sci. v. 38, p. 49-83, illus., 1938; Ohio Geol. Survey Reprint Ser. 1, 35 p., 1939. Preglacial and glacial drainage is described. The routes of Warren and Pittsburgh Rivers are traced. The Ohio River, as we know it, is a Wisconsin feature.
2. Age of fringe drift in eastern Ohio [and southwestern Pa.]: Ohio Jour. Sci., v. 53, p. 183-189, 1953. Evidence is presented to show that the pre-glacial Pittsburgh River flowed northward to Lake Erie. Ice dammed it, and it spilled over the western divide to the southwest into Ohio.

STRACHAN, CLARICE B.

1. Biographical sketches of recently elected honorary members (of American Association of Petroleum Geologists, W[illem] A[nton] J[oseph] M[aria] van Watershoot van der Gracht, and E[dward] O[scar] Ulrich): Am. Assoc. Petroleum Geologists Bull., v. 20, p. 1265-1268, ports., 1936.

STRAHLER, ARTHUR NEWELL

1. Hypotheses of stream development in the folded Appalachians of Pennsylvania. Ph.D. thesis, Columbia Univ., 1944.
2. Memorial to Karl Ver Steeg (1891-1952): Geol. Soc. America Proc. 1952, p. 155-158, port., 1953.

STRONG, HARRY K., *see also,* Roberts, W. F., 2, 4.

1. (chairman, and others). Report to the Legislature of Pennsylvania containing a description of the Swatara Mining District [Dauphin, Lebanon, Schuylkill Cos.]. 61 p., illus., Harrisburg, Boas and Coplan, 1839. A generalized description of the coal-bearing rocks is given. Cross sections through gaps are sketched, with emphasis placed upon the coal beds. The purpose was to gather data to help in the decision regarding the extension or not of the Union Canal.
2. Report . . . being a geological examination of the Donaldson Improvement and Railroad Co.'s coal lands [Schuylkill Co.]. 8 p., illus., Philadelphia, Inquirer Printing Office, 1857. This is a report designed to accompany a prospectus. Anthracite coal is present.

STRUEVE, HEINRICH VON, 1772-1851.

1. Anzeige einer Suite nordamerikanischer Mineralien, *in* Beitrage zur Mineralogie und Geologie des noerdlichen Amerikas, p. 1-22, Hamburg, Perthes and

Beisser, 1822. ". . . consists of seven articles of which six are translations from the American Journal of Science or the Journal of the Academy of Natural Sciences. Article 1 . . . mentions, among other things, the presence of marble from Philadelphia (Schuylkill Marble) and glassy strahlstein (= siderite) from Germantown; white quartzite with chlorite from Lancaster; coal from Pennsylvania, and a few other minerals from Pennsylvania and other states."—H. G. R.

SUESS, HANS EDWARD

1. U. S. Geological Survey radiocarbon dates, [Pt.] 1: Science, v. 120, p. 467-473, table, 1954. Peat from Bridgeville, Allegheny Co., is 23,000 ± 800 years old.

SUN, Y. C.

1. Professor Amadeus William Grabau [1870-1946], biographical note: Geol. Soc. China Bull., v. 27, p. 1-26, illus. incl. port., Peking, 1947.

SUNDSTROM, RAYMOND W.

1. Pennsylvania, *in* Water levels and artesian pressure in observation wells in the United States in 1938: U. S. Geol. Survey Water-Supply Paper 845, p. 414-432, tables, 1938. Levels related to an arbitrary datum plane, and dates, are given in tables. Many, but not all counties are included.

SUTTON, ROBERT GEORGE

1. Lithofacies map of Upper Devonian in eastern United States: Am. Assoc. Petroleum Geologists Bull., v. 41, p. 750-755, illus., 1957. The Commonwealth is included. Most of the state has a sand-shale ratio between 12-49 per cent, but the eastern edge of the Series ranges from 50-80 per cent. Forty to 100 per cent black shale occurs along the eastern area.

SUTTON, WILLARD HOLMES

1. A study of the mineral constitution and ceramic properties of some shales from Pennsylvania [abs.]: Dissert. Abs., v. 17, p. 1287-1288, 1957.

SVETLICH, WILLIAM G.

1. Martinsburg limestones in the Lebanon area [Lebanon Co.], Pennsylvania. M. S. thesis, Wayne State Univ., 1953.

SWAIN, FREDERICK MORRILL, JR., *see also* Dobbins, D. A., 1.

1. (and Kraft, J. C.). Ostracode zones of lower Middle Ordovician in the eastern United States [abs.]: Geol. Soc. America Bull., v. 67, p. 1738, 1956.
2. Stratigraphic data and description of Leperditiidae, Aparchitidae, and Leperditellidae, Pt. 1 *of* Early Middle Ordovician Ostracoda of the eastern United States [Huntingdon, Franklin Cos.]: Jour. Paleontology, v. 31, p. 528-570, illus., 1957. Stratigraphic sections are measured and discussed. The ostracodes are listed in stratigraphic position, illustrated, and described.
3. Organic materials of early Middle Devonian, Mt. Union area [Huntingdon, Mifflin Cos.], Pennsylvania: Am. Assoc. Petroleum Geologists Bull., v. 42, p. 2858-2891, illus., 1958. Bituminous materials range from .002 to .24 per cent, and are saturated hydrocarbons, aromatic hydrocarbons, asphaltenes, and polar compounds. Most have carbon numbers over 20. Saturated hydrocarbons increase upward whereas aromatic hydrocarbons decrease upward. There may be paleogeographic significance. Relations between bituminous and petrologic environments are discussed. Free sulphur is present in some zones. The Newton Hamilton Formation is defined with an upper Hares Valley Shale Member and a lower Beaverdam Run Shale Member.

SWALES, WILLIAM E.

1. Mauch Chunk series in northern West Virginia and southwest Pennsylvania. M. S. thesis, W. Va. Univ., 1951.

SWARTZ, CHARLES KEPHART, 1861-1949, *see also* Clarke, J. M., 3; Prosser, C. S., 1, 2; Schuchert, C., 6.

1. Coelenterata, *in* Systematic paleontology of the Lower Devonian deposits of Maryland: Md. Geol. Survey, Lower Devonian, p. 195-227, illus., 1913. *Cyathophyllum schucherti, Favosites helderbergae, F. h. praecedens, Pleurodictyum lenticulare, Aulopora schohariae, A. schucherti, and Stromatopora constellata* from Bedford Co. are described and illustrated.
2. (and Price, W. A., and Bassler, H.). Coal measures of Maryland: Geol. Soc. America Bull., v. 30, p. 567-596, illus., 1919. In a detailed summary, much reference is made to coal occurrences in southwestern Pennsylvania.

3. (and Baker, W. A., Jr.). Second report on the coals of Maryland: Md. Geol. Survey, v. 11, p. 27-288, illus. incl. geol. map, 1922. A detailed discussion of the Pennsylvanian stratigraphy and coal resources includes some of those in southwestern Pennsylvania.
4. Sections of the Wills Creek and Tonoloway formations: Md. Geol. Survey, Silurian, p. 105-181, illus., 1923. A measured section from Bedford Co. is included; it is very detailed.
5. (and others). Systematic paleontology; Silurian: Md. Geol. Survey, Silurian, p. 393-778, illus., 1923. Bryozoa from Blair Co., nautiloids, brachiopods, and snails from Bedford Co., ostracodes from Mifflin, Blair, Franklin, and Juniata Cos., and trilobites from Bedford Co., are described and illustrated.
6. (and Swartz, F. M.). Early Silurian formations of southeastern Pennsylvania: Geol. Soc. America Bull., v. 42, p. 621-661, illus., 1931. Sections are measured and fossils are listed from the Rose Hill Shale, Keefer Sandstone, Rochester Shale, McKenzie Formation, Bloomsburg red beds, Wills Creek Formation, Inwood Sandstone, Tuscarora Quartzite, and Clinton Shale. Correlations are made.

SWARTZ, FRANK McKIM, *see also* Conlin, R. R., 1; Swartz, C. K., 6.

1. Faunal development, conditions of deposition, and paleogeography of some Appalachian mid-Paleozoic sediments: Panamericano Congresso de Engenharia de Minas e Geologia 2d, Brazil 1945, Anais, v. 3, [pt.] 2, p. 9-33, illus., Petropolis, 1946; reprinted *as* Pa. State Coll., Coll. Mineral Industries Contrib. 46-3 (‡), [1946]. The type, distribution, origin, and faunal contents of the Late Ordovician, Silurian, and Early Devonian rocks are described. Small-scale isopach maps of various units are included. The relation of faunas to environments of deposition is included also.
2. (and Allen, J. E., and Ferm, J. C.). Geologic problems in strip mining and spoil pile treatment: Mineral Industries, v. 17, no. 4, p. 1, 3, illus., 1948. Generalized physical descriptions of spoil banks are given. The local bedrock material is thoroughly mixed in them.
3. Subsurface projection of Cambro-Ordovician sediments in the Pennsylvania-New York region and relation to oil and gas possibilities: Pa. Geol. Survey 4th ser., Bull. G 25, 18 p., illus., 1950; reprinted *from* Producers Monthly, v. 13, no. 11, p. 25-32, illus., 1949; no. 12, p. 28-31, illus., 1949; v. 14, no. 1, p. 25-31, illus., 1949; no. 2, p. 34-39, illus., 1949. Cambro-Ordovician rocks reach a maximum thickness of about 15,000 feet; they are basal sandstones, medial limestones, and topmost shale and sandstone. The paleogeography is discussed. Correlations are made. The oil and gas possibilities of each unit are considered.
4. Description of the Paleozoic sediments in western and central Pennsylvania, *in* Pittsburgh Geol. Soc., Field guidebook of Appalachian geology, Pittsburgh to New York, 1955, p. 70-86, 1955. Descriptions of Cambrian-Permian rocks to be seen along the route of a field trip are given.
5. Stratigraphy and structure in the Ridge and Valley area from University Park [Centre Co.] to Tyrone [Blair Co.], Mt. Union [Huntingdon Co.], and Lewiston [Mifflin Co.], *in* Field Conf. of Pa. Geologists 21st, S1-S11, SI1-SI35 (‡), illus., [1955]; with material on petrology of the Reedsville, Oswego and Juniata Formations by P. D. Krynine. Ordovician-Mississippian rocks are described; fossils are listed, and a brief description of the geomorphology and structural geology of the area is given. A road log with stop descriptions follows. Small-scale isopach maps of different units are included.
6. (and others). Stratigraphy of Ordovician limestones and dolomites of Nittany Valley in area from Bellefonte to Pleasant Gap [Centre Co.], Pennsylvania, *in* Field Conf. of Pa. Geologists 21st, p. F1-F24 (‡), illus., [1955]. Detailed descriptions of the Cambrian and Ordovician rocks are given. Fossils are listed. These are followed by a road log and stop descriptions for a field trip from State College to Bellefonte to Pleasant Gap.
7. Muscle marks, hinge and overlap features, and a classification of some Leperditiidae: Jour. Paleontology, v. 23, p. 306-327, illus., 1949; discussion with title, *Swartzochilina*, new genus of isochilinid ostracode, by H. W. Scott, v. 30, p. 1374-1375, 1956. Ostracodes from Ordovician-Devonian rocks in many different places in the Commonwealth are described and illustrated.

8. Geologic features of the Allegheny Front region betwewen Johnstown [Cambria Co.] and Williamsburg [Blair Co.], central Pennsylvania: Pa. State Univ. Dept. Geology Contrib. 1, 36 p. (‡), illus., 1957. Cambrian-Pennsylvanian rocks along the route of a field trip are described. Cross sections and road logs are included.
9. (and Thompson, R. R.). Commercial possibilities of some Ordovician limestones in Franklin County, Pennsylvania: Pa. State Univ., Mineral Industries Exper. Sta. Bull. 71, p. 1-14, illus., 1958. Chemical analyses, geographic distribution, and thickness measurements are given for the Row Park and New Market Limestones. Their various uses are discussed.
10. Mid-Appalachian Devonian fossils: Pa. State Univ. Dept. Geology Contrib. 5, 16 plates, 1958. Illustrations of Devonian fossils, many from the Commonwealth, are given without description.
11. Mid-Appalachian Silurian fossils: Pa. State Univ. Dept. Geology Contrib. 4, 16 plates, 1958. Illustrations of Silurian fossils, many from the Commonwealth, are given without description.
12. (and Hambleton, H. J.). Potential tonnages of the Center iron sandstone in Perry County, Pennsylvania: Pa. State Univ., Mineral Industries Exper. Sta. Bull. 71, p. 19-27, illus., 1958. Chemical analyses, petrographic descriptions, and geologic occurrence are discussed. In Perry Co. the Center iron sandstone is 60 feet thick and has 12-14 per cent iron present as cement. About 100 million tons of ore are present.
13. Silurian sediments and relationships at Susquehanna Gap in Blue, or Kittatinny Mountain, five miles north of Harrisburg [Dauphin Co.], Pennsylvania: Pa. State Univ. Dept. Geology Contrib. 3, 58 p. (‡), illus., 1958. A detailed section of 2500 feet is described. The general geological origin and depositional environment are discussed. Small-scale isopach and isolithic maps of various Silurian units are included.

SWINGLE, R. J., *see* Snyder, N. H., 1.

SZMUC, EUGENE JOSEPH

1. Stratigraphy of the Cuyahoga Formation and Shenango Sandstone of northern Ohio and northwestern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1684, 1959.

TARR, MRS. WILLIAM ARTHUR

1. "James Dwight Dana (1813-1895), America's first great student of earth science": Compass, v. 15, p. 1-8, port., 1934.

TASCH, PAUL, *see also* Wilson. J. L., 2.

1. Fauna of the Upper Cambrian Warrior Formation of central Pennsylvania. M. S. thesis, Pa. State Coll., 1950.
2. A cyclical occurrence of *Cryptozoon undulatum* [Centre Co.]: Am. Midland Naturalist, v. 46, p. 751-753, 1951. Reef facies a few inches thick alternate with non-reef limestone a few inches thick in the Warrior Limestone of Cambrian age. Edgewise conglomerates and oolites are also interbedded. The cycle alternates from (1) times of clear, warm, well-lighted, shallow water favorable for algae, to (2) times of increasing turbidity caused by transported sediments, choking off algae growth, to (3) times of excessive shoaling of water, and then back to (1).
3. A new illaenid trilobite from the Middle Ordovician of [Centre Co.] central Pennsylvania: Canadian Field-Naturalist, v. 65, p. 163-166, illus., Ottawa 1951. *Illaenus lemontensis* from the Nealmont Formation near Oak Hall is described and illustrated.
4. Fauna and paleoecology of the Upper Cambrian Warrior Formation of central Pennsylvania: Jour. Paleontology, v. 25, p. 275-306, illus., 1951. Thirty-four additional species of trilobites are added to the known fauna of the Warrior Formation. Some brachiopods are also described. Data showing facies and faunal occurrences are given for a measured section 746 feet thick. Interpretations indicate a cycle of alternations between clear water with *Cryptozoon* reefs, clay-turbid water, and tidal flats. Fossils are listed and illustrated; sections are measured.

TAYLOR, FRANK BURSLEY, 1860-1938, *see also* Leverett, F., 3.

1. The glacial and postglacial lakes of the Great Lakes region: Smithson. Inst. Ann. Rept. 1912, p. 291-327, illus., 1913. A summary of lake history includes

maps which include on them the Commonwealth. The distribution of the glacial lakes Whittlesey, Warren, and Lundy are shown.

TAYLOR, RICHARD COWLING, 1789-1851.

1. Report on the surveys . . . from . . . Blossburg . . . to Lawrenceville [Tioga Co.] and a mineralogical report on the coal region in the environs of Blossburg. 56 p., illus., Philadelphia, Mifflin and Parry, 1833. This includes detailed descriptions of geomorphology, strata, and mineral resources along the route of a projected railroad. Coal, iron, limestone, stone, and fire clay are described as potential mineral resources.
2. Two reports on the coal lands, mines, . . . of the Dauphin and Susquehanna Coal Co. . . . and on the Stony Creek Coal Estate . . . Dauphin and Lebanon Cos. . . . . 113 p., and 74 p., illus., Philadelphia, E. G. Dorsey, 1840. [Pennsylsylvanian] strata, anthracite coal seams, iron ore, reserves, fire clay, and plastic clay are described. There is no stratigraphic discussion. The coal at the west extremity of Short Mountain is called bituminous.

TAYLOR, THOMAS GARRETT

1. The silica refractories of Pennsylvania. M. S. thesis, Pa. State Coll., 1922.

TEAS, LIVINGSTON PIERSON

1. Heinrich Ries (1871-1951): Am. Assoc. Petroleum Geologists Bull., v. 35, p. 2638-2641, port., 1951.

TEDROW, JOHN C. F.

1. (and Wilkerson, A. S.). Weathering of glacial soil material [northeastern Pa.]: Soil Science, v. 75, p. 345-353, illus., 1953. Martinsburg Shale fragments and Pocono Sandstone fragments, both fresh and from glacial tills of varying ages, are examined chemically. The iron content increases proportionately with the length of weathering. The relative amounts of other weathering products are also compared. A soil classification is proposed.
2. Clay minerals in three podzol profiles [Pocono Plateau]: Soil Sci. Soc. Am. Proc., v. 18, p. 479-481, tables, 1954. Clay from well-developed podzols of gray, acid-sandstone glacial tills of Kansan, Illinoisian, and Wisconsin ages are identified. The predominant minerals in the clay are interstratified 2:1 layer silicates, quartz, illite, and kaolinite. Vermiculite or chlorite are present in lower zones of older tills. The clays, while showing a slight variation with age, are basically similar.

TEICHERT, CURT, *see* Foerste, A. F., 2.

TERRIERE, ROBERT T.

1. The Mississippian sediments of the Bedford Quadrangle [Bedford Co.] region. M. S. thesis, Pa. State Coll., 1951.

TESCHEMACHER, JAMES ENGLEBERT, 1790-1853.

1. [Coal flora from the anthracite region] [abs.]: Boston Soc. Nat. Hist. Proc., v. 3, p. 8-9, 35, 1851.

TESMER, IRVING HOWARD

1. Proposed sequence of Upper Devonian or Mississippian conglomerates in southwestern New York and northwestern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 69, p. 1651, 1958.

THAMM, JOHN K., JR.

1. Geology of part of the Seven Mountains District of central Pennsylvania. M. A. thesis, Pa. State Univ., 1956.

THARIN, JAMES C., *see* Droste, J. B., 4.

THEISSEN, REINHARDT, 1867-1938, *see also* Sprunk, G. C., 1; White, C. D., 3.

1. Structure in Paleozoic bituminous coals: U. S. Bur. Mines Bull. 117, xiii, 296 p., illus., 1920. Examples from many places in the Commonwealth are used to show petrographic structures.
2. Under the microscope coal has already lost much of its former mystery: Coal Age, v. 18. p. 1183-1189, 1223-1226, 1275-1279, illus., 1920; v. 19, p. 12-15, illus., 1921. Coal from Pennsylvania is used for descriptions of the origin, composition, and other features of coal.
3. (and Sprunk, G. C.). Microscopic and petrographic studies of certain American coals: U. S. Bur. Mines Tech. Paper 564, 71 p., illus.. 1935. Coal from the Upper Freeport bed in Allegheny Co. is included with others in a detailed petrographic analysis.

THOM, WILLIAM TAYLOR, JR.

1. Post-Triassic evolution of a part of the Atlantic Coastal region [abs.]: Oil and Gas Jour., v. 44, no. 48, p. 88, 1946: Am. Assoc. Petroleum Geologists Bull., v. 30, p. 742-743, 1946.
2. Marcellus Henry Stow (1902-1957): Am. Assoc. Petroleum Geologists Bull., v. 42, p. 1771-1773, port., 1958.
3. Memorial to Marcellus Henry Stow (1902-1957): Geol. Soc. America Proc. 1957, p. 165-166, port., 1958.
4. Tectonic sketch map of North America showing regional structural features and approximate configuration of surface of basement complex. Scale 1:10,000,000 (about 1 inch to 158 miles), Red Lodge, Mont., Yellowstone-Bighorn Research Assoc., 1959.

THOMAS, CHARLES A.

1. New exposures of brucite and deweylite near West Chester [Delaware, Chester Cos.], Penn.: Rocks and Minerals, v. 34, p. 301-302, 1959. Serpentine-associated minerals from along new-road-cut exposures are described.

THOMAS, DAVID, 1776-1859.

1. Geological remarks between Buffaloe in New York and Pittsburg, in [Allegheny Co.] Pennsylvania: Atlantic Jour. and Friend of Knowledge, v. 1, p. 135-137, 1832. A cursory description of the physiography of western Pennsylvania is included.

THOMAS, JOHN MOORE

1. Potential deep reservoir beds in western Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1955.

THOMSON, ELIZABETH H., *see* Fulton, J. H., 1.

THOMPSON, RICHARD R., *see* Swartz, F. M., 9.

THORINGTON, J. MONROE

1. Rollin Thomas Chamberlin, 1881-1948: Am. Alpine Jour., v. 7, p. 205-206, port., 1949.

THORNTON, CHARLES PERKINS

1. Mineralogy at Penn State, *in* Montgomery, A., chm., Symposium on the teaching of elementary mineralogy: Jour. Geol. Education, v. 4, p. 72-76, 1956. Problems in teaching at a large state University are described; the curriculum is outlined.

TILTON, GEORGE ROBERT

1. (and Wetherill, G. W., and Davis, G. L.). Mineral ages from rocks of the Appalachian orogenic zone [abs.]: Geol. Soc. America Bull., v. 69, p. 1653, 1958.

TIMKO, DONALD J.

1. Geology of portions of the Boyertown and Allentown Quadrangles, Berks County, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1956.

TINDELL, WILLIAM N.

1. Cyclical sedimentation of the Middle Conemaugh Series in the Pittsburgh area [Allegheny Co.]. M. S. thesis, Univ. Pittsburgh, 1950.

TIPPLE, KATHRYN K. DEDMAN, *see* Dedman, Kathryn K.

TOMLINSON, W. HAROLD

1. Assimilation (?) of micaceous schist by diabase [Lancaster Co.] [abs.]: Am. Mineralogist, v. 35, p. 290, 1950.
2. Relation of micropegmatite to pegmatite at Safe Harbor [Lancaster Co.], Pennsylvania [abs.]: Geol. Soc. America Bull., v. 62, p. 1485-1486, 1951; Am. Mineralogist, v. 37, p. 302-303, 1952.
3. Xenoliths of enstatite rock in Lima Granite [Delaware Co.]: Pa. Acad. Sci. Proc., v. 28, p. 189-192, 1954. A partially mylonitized granite contains xenoliths of enstatite-bearing peridotite. Both are described mineralogically and texturally. Radiating actinolite occurs at the outer borders of the xenolith. Since both the granite and the xenolith are slightly dynamically metamorphosed, the radiating crystals must be a later development. Other metamorphic details are described.
4. Calcareous sandstone strata in Wissahickon Formation in Delaware County, Pennsylvania: Pa. Acad. Sci. Proc., v. 30, p. 163-166, 1956. Lime-rich strata in the Wissahickon Formation are described, analyzed, and compared with adjacent strata. They are interpreted as regionally altered calcareous sandstones.

TOOKER, EDWIN W., *see* Gault, H. R., 5.

TRAVIS, CHARLES

1. Pyrite from Cornwall, Lebanon County, Pennsylvania. Ph.D. thesis, Univ. Pa., 1906.

TREXLER, JOHN PETER, *see also* Wood, G. H., Jr., 1, 2.

1. Geology of Godfrey Ridge, near Stroudsburg [Monroe Co.], Pennsylvania. M. S. thesis, Lehigh Univ., 1953.

TROEDSSON, GUSTAF T.

1. Charles Schuchert [1858-1942], in memoriam: Geol. Foeren. Stockholm Forh., v. 65, p. 427-429, port., 1943.

TROWBRIDGE, ARTHUR CARLETON

1. Eugene Wesley Shaw [1881-1935]: Am. Assoc. Petroleum Geologists Bull., v. 20, p. 239-240, 1936.

TRUDELL, HARRY WILLIAM

1. Samuel G[eorge] Gordon [1897-1952]: Rocks and Minerals, v. 27, p. 478-480, port., 1952.

TRUEMAN, ARTHUR ELIJAH

1. Stratigraphical problems in the Coal Measures of Europe and North America: Geol. Soc. London Quart. Jour., v. 102, Proc. p. xlix-xciii, illus., 1946. An address includes a cursory description of the Pennsylvanian paleogeography of North America, including that of the Commonwealth.

TRUMP, GEORGE W.

1. Geology of the northeastern part of the Boyertown Quadrangle, Berks County, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1954.

TURLEY, MITCHELL READ

1. Upper Devonian sediments of the Bedford Quadrangle [Bedford Co.]. M. S. thesis, Pa. State Coll., 1952.

TURNER, HOMER GRIFFIELD, *see also* Farrell, M., 1.

1. (and Randall, H. R.) A preliminary report on the microscopy of anthracite coal: Jour. Geology, v. 31, p. 306-313, illus., 1923. Various coal samples from unspecified locations in the anthracite regions are used as examples in showing microscopic textures and structures.
2. Microscopical structure of anthracite: Lehigh Univ. Inst. Research Circ. 2, 21 p., illus., 1925. The technique of examining polished surfaces in the study of anthracite coal is demonstrated. Many samples from the anthracite fields of the Commonwealth are illustrated and evaluated. Banding is present, and wood textures can be detected. Anthraxylon, durain, and clarain are also recognizable.
3. Anthracites and semianthracites of Pennsylvania: Am. Inst. Min. Engineers Trans., v. 108, p. 330-342, [1934]; discussions, p. 342-343. Analyses are given, and physical properties of coal from many different places are discussed. The coal of Sullivan Co. is defined as semianthracite.

TURNER, T. D., *see also* Francis, K., 1.

1. Rock caves #1 and #2 . . . Centre County, Pa.: Speleo Digest 1958, pt. 1, p. 1-7 (‡), illus., 1959; reprinted *from* Nittany Grotto Newsletter, v. 6, no. 5, 1958. Brief descriptions and a sketch map are included.
2. Bear Den Cave, Huntingdon County: Nittany Grotto Newsletter, v. 7, p. 106 (‡), illus., 1959. Bear Den Cave is described and sketch-mapped.
3. Hosterman's Pit [cave], Centre County: Nittany Grotto Newsletter, v. 7, p. 111-112 (‡), illus., 1959. The cave is described; a sketch map is included.
4. Limestone springs of central Pennsylvania: Nittany Grotto Newsletter, v. 7, p. 127, 129 (‡), 1959. The larger and better known springs are listed by county, and tables give name, formation, elevation, discharge in gallons per minute, and remarks.
5. Madisonburg Cave, Centre Co.: Nittany Grotto Newsletter, v. 7, p. 121 (‡), illus., 1959. The cave in Trenton Limestone is briefly described; a sketch map is included.

TWENHOFEL, WILLIAM HENRY, 1875-1957.

1. Professor Charles Schuchert [1858-1942]: Jour. Sed. Petrology, v. 12, p. 137, 1942; v. 13, p. 121-129, port., 1943.
2. (chairman, and others). Correlation of the Ordovician formations of North America: Geol. Soc. America Bull., v. 65, p. 247-298, illus., 1954. Time-rock

charts of Ordovician formations in North America include those of the Commonwealth.

TYSON, PHILIP THOMAS, 1799-1877.

1. Report of the mineral lands of the Juniata Iron Company in Juniata County, Pennsylvania. 13 p., illus., Baltimore, J. D. Toy, 1858. Clinton ore from Silurian rocks is described and analyzed. A section is measured.

ULRICH, EDWARD OSCAR, 1857-1944, *see also* Swartz, C. K., 5.

1. (and Bassler, R. S.). Bryozoa [Part 1] *of* Molluscoidea, *in* Systematic paleontology of the Lower Devonian deposits of Maryland: Md. Geol. Survey, Lower Devonian, p. 259-290, illus., 1913. *Semicoscinium planum* from the Keyser Limestone in Bedford Co. is described and illustrated.
2. (and Bassler, R. S.). American Silurian formations: Md. Geol. Survey, Silurian, p. 233-270, illus., 1923. This is a general discussion of Silurian correlation problems. New York and Maryland sections are compared with those from the Commonwealth. No details are given.
3. (and Foerste, A. F.). New genera of Ozarkian and Canadian cephalopods: Denison Univ. Bull., Jour. Sci. Labs., v. 30, p. 259-290, illus., 1935. *Stemtonoceras elongatum* from [Lower Ordovician] limestone in a quarry near Stemton, Lehigh Co., is described and illustrated.
4. (and Cooper, G. A.). New genera and species of Ozarkian and Canadian brachiopods: Jour. Paleontology, v. 10, p. 616-631, 1936. *Diaphelasma pennsylvanicum* is listed from the Nittany Formation in Blair Co.
5. (and Cooper, G. A.). Ozarkian and Canadian Brachiopoda: Geol. Soc. America Spec. Paper 13, viii, 323 p., illus., 1938. *Diaphelasma pennsylvanicum* from Huntingdon Co., *Diporolasma* spp. from Centre, Huntingdon, and Lehigh Cos., *Finkelnburgia plicata* from Centre Co., *Lingula* (?) *pennsylvanica* from Huntingdon Co., *Nothorthis pennsylvanica* from Franklin Co., *Schizambon pennsylvanicum* from central Pa., and *Tritoechia pennsylvanica* from Huntingdon Co. are described and illustrated. All are Ordovician.
6. (and Foerste, A. F., and Miller, A. K., and Furnish, W. M.). Nautilicones, Part I *of* Ozarkian and Canadian cephalopods: Geol. Soc. America Spec. Paper 37, x, 157 p., illus., 1942. *Centrotarphyceras* (?) cf *sellyi* from Montgomery Co., *Pionoceras swartzi* from Centre Co., and *Curtoceras internostriatum* from Franklin Co. are described and illustrated. All are Ordovician.
7. (and Foerste, A. F., and Miller, A. K., and Unklesbay, A. G.). Longicones, and Summary, Part III *of* Ozarkian and Canadian cephalopods: Geol. Soc. America Spec. Paper 58, x, 226 p., illus., 1944. *Stemtonoceras elongatum* from Cambrian rocks in Lehigh Co. is described and illustrated.

UMBGROVE, JOHANNES HERMAN FREDERIK, 1899-1954.

1. Memorial to Willem Antonius Josephus Maria van Waterschoot van der Gracht [1873-1943]: Geol. Soc. America Proc. 1946, p. 231-236, illus., 1947.

UNION COAL COMPANY

1. Charter of the Union Coal Company situated in Somerset County, Pennsylvania, with a description of the coal and iron mines and other minerals. . . . 27 p., illus., Baltimore, John W. Woods, 1853. A prospectus contains geological descriptions of the coal, iron, and limestone which are present. Cross sections and columnar sections show the coal relations in the Savage Mountain area. Some analyses of the coal and iron ore are included.

UNITED STATES GEOLOGICAL SURVEY

1. Fuel reserves of the United States. 49 p., illus., 1951. Reserves are given for all of the states, including the Commonwealth. In 1950 there were over 60 billion tons of bituminous coal, 12 billion tons of anthracite, over 105 million barrels of oil, and over 620 million cubic feet of gas in reserve.

UNITED STATES GEOLOGICAL SURVEY, ENGINEERING GEOLOGY AND GROUND WATER BRANCHES

1. Interpreting geologic maps for engineering purposes—Hollidaysburg Quadrangle [Blair, Bedford, Huntingdon Cos.], Pennsylvania. Unpaged folio, illus. incl. geol. map with text, 1953. A set of maps has been prepared to show the kinds of information useful to engineers that can be derived from maps. A topographic map, a conventional areal geologic map, a map showing distributions of foundation and excavation conditions, a construction ma-

terials map, a water-supply map, and an engineering site-selection map are included; all are on the quadrangle base.

UNKLESBAY, ATHEL GLYDE, *see also* Ulrich, E. O., 7.

1. Distribution of American Pennsylvanian cephalopods: Jour. Paleontology, v. 28, p. 84-95, illus., 1954. A list of nautiloids from the Vanport, Hamden, Washington, Brush Creek, Pine Creek, Woods Run, and Ames Formations is given. A range chart is included.

UPHAM, WARREN, 1850-1934.

1. Prof. Henry Carvill Lewis [1853-1888] and his work in glacial geology: Am. Geologist, v. 2, p. 371-379, port., 1888.
2. The work of Prof. Henry Carvill Lewis [1853-1888] in glacial geology: Geol. Mag. 3d dec., v. 6, p. 155-160, London, 1889.
3. Memorial of Charles Henry Hitchcock [1836-1919]: Geol. Soc. America Bull., v. 31, p. 64-80, port., 1920.

URRY, WILLIAM DONALD

1. Ages by the helium method, [Part] 2, post-Keweenawan: Geol. Soc. America Bull., v. 47, p. 1217-1234, 1936. Diabase from Lebanon County, in the Martinsburg Formation, is shown to be 300-400 million years old and is considered to be Ordovician in age. Basalt at the base of the Martinsburg Formation is 140-145 million years old; it too, is Ordovician.

VACQUIER, VICTOR

1. (and others). Interpretation of aeromagnetic maps: Geol. Soc. America Mem. 47, 151 p., illus., 1951. A discussion of the principles and techniques includes examples from central Pennsylvania. The basement complex is buried beneath 3 miles of sedimentary rocks. The intrabasement units have different lithologies. Maps are included.

VAN HOUTEN, FRANKLYN BOSWORTH

1. (and Olson, R. C., Jr.). Lithology of Upper Triassic Lockatong argillite [southeastern Pa.] [abs.]: Geol. Soc. America Bull., v. 68, p. 1808, 1957.

VAN TUYL, DONALD WELLS, *see also* Mangan, J. W., 2.

1. Ground-water resources of the valley-fill deposits in the Pittsburgh area [Allegheny Co.]: Pa. Acad. Sci. Proc., v. 24, p. 155-160, 1950. A survey includes much detail regarding ground-water production techniques and problems. The valley-fill material is gravel of Pleistocene age overlain by Recent flood plain material. The total thickness ranges from 40 to 130 feet. Up to 100 million gallons of water per day are possible.
2. Ground water for air-conditioning at Pittsburgh [Allegheny Co.], Pennsylvania: Pa. Geol. Survey 4th ser., Bull. W 10, iv, 34 p., illus., 1951. Factors affecting the availability of ground water in the Triangle area are discussed. The ground-water comes from valley-fill deposits. Pumping rates, analyses, and water potential are included.
3. (and Klein, N. H.). Ground-water resources of Beaver County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. W 9, Supp. to Bull. W 3, iv, 84 p., illus. incl. geol. map, 1951. The subsurface rock formations in the Pennsylvanian System are described. They are not sources of large amounts of water. The chief source of ground-water is the valley-fill deposits, some of which are over 130 feet thick. Well records are included.
4. The availability of water: Pa. Dept. Internal Affairs Monthly Bull., v. 20, no. 10, p. 25-29, 1952. A semi-popular account of the philosophy of ground water use and conservation includes examples from the Pittsburgh area, in Allegheny Co.

VAN VALKENBURG, SAMUEL

1. Wallace W[alter] Atwood [1872-1949]: Geog. Review, v. 39, p. 675-676, 1949.

VANUXEM, LARDNER, 1792-1848.

1. Fourth annual report of the Third District, *in* N. Y. State Geologist Ann. Rept. 4th, p. 356-383, 1840. The Devonian rocks of south central New York are systematically described. The type section of the Montrose Sandstone is in Susquehanna County.

VARODY, ELLA H.

1. Physiographic aspects of the Gettysburg Campaign [Adams Co.]. M. A. thesis, Columbia Univ.. 1926.

VATTER, ALBERT E., *see* Droste, J. B., 3.

VAUGHAN, PETER PAUL

1. On the geologic range of the labyrinthodont amphibian *Eryops* [Allegheny, Greene Cos.]: Jour. Paleontology, v. 32, p. 918-922, 1958. *Glaukerpeton avinoffi* from the Conemaugh Formation in Allegheny Co. is shown to belong to *Eryops*. This extends the range of the genus downward.

VEATCH, ARTHUR CLIFFORD, 1878-1938, *see* Fuller, M. L., 1.

VER STEEG, KARL, 1891-1952, *see* Johnson, D. W., 1.

VER WIEBE, WALTER AUGUST, 1897-.

1. Oil and gas in the United States, *in* Science of petroleum, v. 1, p. 66-95, illus., London and N. Y., Oxford Univ. Press, 1938. A general review of the occurrences of petroleum includes those of the Commonwealth. No new data are included.
2. Appalachia—a landmass [abs.]: Oil and Gas Jour., v. 50, no. 46, p. 168, 1952; Am. Assoc. Petroleum Geologists Bull., v. 36, p. 924-925, 1952.
3. New light on the Appalachian Geosyncline [abs.]: Geol. Soc. America Bull., v. 63, p. 1374, 1952.
4. North American petroleum. 459 p., illus., Wichita, Kans. [Ann Arbor, Edwards Bros.], 1952. A survey of the petroleum fields of North America includes those of the Appalachian area, which includes those of the Commonwealth. A general description of the sedimentation history and structures is given. No new data are present.

VICKERS, ROLLIN C., *see* Schnabel, R. W., 1.

VIRGIN, WILLIAM W., JR.

1. The pegmatite problem at Morgan Hill, Easton [Northampton Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 29, p. 199-202, illus., 1955. Pegmatites occur in Precambrian rocks and in the Cambrian Hardyston Formation. Structural and petrographic relationships are discussed. At least two periods of pegmatite formation are hypothesized, one Precambrian, one post-Cambrian.
2. Pinite-schist in [south] eastern Pennsylvania: Pa. Acad. Sci. Proc., v. 30, p. 150-156, illus., 1956. Pinite from the Precambrian-Cambrian contact in Lehigh, Bucks, and Northampton Cos. is described and analyzed. It is interpreted as a metamorphosed residual soil.

VISHER, STEPHEN SARGENT

1. Nelson H[oratio] Darton, 1865-1948: Assoc. Am. Geographers Annals, v. 38, p. 226, 1948.
2. Bailey Willis, 1857-1949: Assoc. Am. Geographers Annals, v. 39, p. 291-292, 1949.

VLISIDIS, ANGELINA CALOMERIS, *see* Glass, J. J., 1.

VOZOFF, KEEVA, *see also* Howell, B. F., Jr., 2.

1. Gravity investigation in north central Pennsylvania: Thesis, Pa. State Coll., 1951.

WAGNER, HOLLY CLYDE, *see also* Danilchick, W., 1; Haley, B. R., 1, 2; Kehn, T. M., 1; Rothrock, H. E., 2, 3, 4, 5.

1. Constitution diagrams of Pennsylvania anthracite: U. S. Geol. Survey Bull. 995-A, p. iii, 1-18, illus., 1953. Attempts to correlate anthracite beds on the basis of arrangement and percentage of the internal constituents of the coal are reported. "Accumulation of coal-forming debris was generally cyclic in nature, coal constitution diagrams are useful, and further study is necessary."

WAGNER, NORMAN SPENCER

1. The structural geology of part of the Pocono Plateau [northeastern Pa.]. M. A. thesis, Cornell Univ., 1933.

WAGNER, WALTER RICHARD, *see also* Lytle, W. S., 7, 9.

1. Albert No. 1 Well, Adams Township, Snyder County: Pa. Geol. Survey [4th ser.], Well-Sample Record 41, 23 p., 1958. A detailed sample log, starting in Middle Devonian rocks and ending in the Silurian Rose Hill Formation, has a depth of 5965 feet.
2. Emma McKnight No. 1 Well, Pymatuning Township, Mercer County: Pa. Geol. Survey [4th ser.], Well Sample Record 40, 33 p., 1958. The well begins in Mississippian rocks and ends in the Cambrian Warrior Formation. Detailed sample descriptions are given. The well is 8210 feet deep.
3. Good Will-Curley No. 1 Well, Summit Township, Erie County: Pa. Geol. Survey [4th ser.], Well Sample Record 39, 48 p., 1958. Detailed sample analyses

of a well which starts in the Onondaga Formation and ends in the Cambrian Gatesburg Formation are given. The well is 6015 feet deep.

4. Catalogue of deep well samples and geophysical logs to January 1, 1959: Pa. Geol. Survey 4th ser., Inf. Circ. 16, 84 p., illus., 1959. Wells are listed by county. Depth, date completed, depth intervals, geologic intervals, remarks, and depths from which samples are taken are the heads of columns. The actual samples are not described. A list, by county, of geophysical logs available is also given.

WAGNER FREE INSTITUTE OF SCIENCE

1. Type invertebrate fossils of North America (Devonian). Division I, Lower Groups; II, Echinodermata; III, Bryozoa; V, Pelecypoda; VI, Gastropoda and allied groups; VII, Cephalopoda; VIII, Trilobita; IX, Ostracoda; X, other Crustacea; XI, Merostomata. 22x36 cm. cards, illus., 1936-. This is a continuously-published card file. Many species are from the Commonwealth.

WAINWRIGHT, JOHN ERNEST NOLAN

1. Morphology and taxonomy of some Middle Silurian Ostracoda [Central Pa.] [abs.]: Dissert. Abs., v. 20, p. 1746, 1959.

WALCOTT, CHARLES DOOLITTLE, 1850-1927.

1. Cambrian Brachiopoda genera *Iphidea* and *Yorkia*, with descriptions of new species of each, and of the genus *Acrothele* [York Co.]: U. S. Natl. Mus. Proc., v. 19, p. 707-718, illus., 1897. *Yorkia wanneri* and *Acrothele decipiens* from Lower Cambrian shale are described.
2. Cambrian Brachiopoda with descriptions of new genera and species: U. S. Natl. Mus. Proc., v. 28, p. 227-337, 1905. *Nisusia festinata* from York Co., near Emigsville, is described.
3. Cambrian Brachiopoda—descriptions of new genera and species, no. 3 *of* [Part I] *of* Cambrian geology and paleontology: Smithson. Misc. Coll., v. 53, p. 53-137, illus., 1910. *Acrothele yorkensis* from the [Kinzers Formation] in York Co. is described and illustrated.
4. *Dikelocephalus* and other genera of the Dikelocephalinae, no. 13, *of* [Part] 2 *of* Cambrian geology and paleontology: Smithson. Misc. Coll., v. 57, p. 346-412, illus., 1910. *Saukia stosei* from the Conococheague Limestone in Franklin Co. is described and illustrated.
5. *Olenellus* and other genera of the Mesonacidae, no. 6 *of* [Part 1] *of* Cambrian geology and paleontology: Smithson. Misc. Coll., v. 53, p. 231-422, illus., 1910. *Olenellus thompsoni, O. t. crassimarginatus, Wanneria walcottanus,* and *Paedumias transitans* from York and Lancaster Cos. are described and illustrated.
6. Cambrian trilobites, no. 3 *of* [Part] III *of* Cambrian geology and paleontology: Smithson. Misc. Coll., v. 64. p. 157-258, illus., 1916. *Millardia avitas* from the Buffalo Run Limestone in Centre Co., *Acrocephalites aoris* from Blair Co., and *Wanneria walcottana* from the [Kinzers Formation] in Lancaster Co. are described and illustrated.
7. Cambrian trilobites, no. 5 *of* [Part] III *of* Cambrian geology and paleontology: Smithson. Misc. Coll., v. 64, p. 303-456, illus., 1916. *Corynexochus bubaris, C. capito, C. senectus,* and *Bathyuriscus (Poliella) balus* from York Co., and *Asaphiscus duris* and *A. florus* from Bedford Co. are described and illustrated.
8. Cambrian and Lower Ozarkian trilobites, no. 2 *of* [Part] V *of* Cambrian geology and paleontology: Smithson. Misc. Coll., v. 75, no. 2, p. 53-60, illus., 1924. *Bellefontia, Elvina,* and *Ucebia* are new genera erected, the types of which come from Centre Co.
9. Cambrian and Ozarkian trilobites, no. 3 *of* [Part] V *of* Cambrian geology and paleontology: Smithson. Misc. Coll., v. 75, p. 61-146, illus., 1925. *Bellefontia collieana* from the Stonehenge Limestone of Ordovician age and *Ucebia ara* from the Warrior Limestone of Cambrian age from Centre Co. are described and illustrated.

WALKER, PHILIP CALEB

1. The forest sequence of the Hartstown bog area [Crawford Co.] [abs.]: Dissert. Abs., v. 18, p. 1959, 1958.

WALLACE, JOSEPH J.

1. (and others). Estimate of known recoverable reserves of coking coal in Allegheny County, Pa.: U. S. Bur. Mines Rept. Inv. 5003, vi, 16 p. (‡), illus., 1953. There are over 830 million short tons of coal remaining in the ground. The Pittsburgh and Upper Freeport coal beds are the most important producers. Some analyses are included.
2. (and others). Estimate of known recoverable reserves of coking coal in Somerset County, Pa.: U. S. Bur. Mines Rept. Inv. 4998, vi, 20 p. (‡), illus., 1953. Over 1,800 million short tons of coal remain. There are 8 important coal beds; the Upper Kittanning is the most important. Some analyses are made.
3. (and others). Estimate of known recoverable reserves of coking coal in Greene County, Pa.: U. S. Bur. Mines Rept. Inv. 5143, vi, 22 p., illus., 1955. The total short tons in reserve are estimated to be 6,011 million. The Pittsburgh coal is the most important producer. Some analyses are included.
4. (and others). Estimates of known recoverable reserves of coking coal in Washington County, Pa.: U. S. Bur. Mines Rept. Inv. 5109, vi, 23 p., illus., 1955. There are over 4,180 million short tons of coal remaining in the ground. The Pittsburgh coal bed is the most important producer. Some analyses are included.

WALTHIER, THOMAS NASH

1. Uranium occurrences of the eastern United States: Mining Eng., v. 7, p. 545-547, illus., 1955; reprinted with title, Pennsylvania deposits among uranium occurrences of east, listed by former AEC expert: Pa. Dept. Internal Affairs Monthly Bull., v. 23, no. 10, p. 17-23, 29, illus., 1955. The deposit at Jim Thorpe, Carbon Co., is described. Uranium-bearing minerals occur along joint planes in the Pottsville Formation. Other small deposits nearby in the Catskill Formation are also described. Some of the Triassic conglomerates are radioactive.

WANLESS, HAROLD ROLLIN

1. Late Paleozoic cycles of sedimentation in the United States: Internatl. Geol. Cong. 18th, Great Britain 1948, Rept., pt. 4, p. 17-28, illus., London, 1950. A review of cyclothemic deposition includes many references to, and examples from, the Commonwealth.
2. Geographic and stratigraphic distribution of Pennsylvanian coal in the United States [abs.]: Econ. Geology, v. 47, p. 778-779, 1952; Geol. Soc. America Bull., v. 63, p. 1309, 1952.
3. Depositional basins of some widespread Pennsylvanian coal beds in the United States: Conf. on origin and constitution of coal 3d, Nova Scotia 1956, [Proc.], p. 94-125, illus., Nova Scotia Dept. Mines, [1956]; discussions, p. 125-128. Coal basins, including the Appalachian in western Pennsylvania, are discussed as sedimentary traps. The Middle Mercer coal basin, Clarion coal basin, Lower Kittanning coal basin, Middle Kittanning coal basin, Upper Freeport coal basin, and the Pittsburgh coal basin are described and illustrated by maps showing the distribution of features (marsh, lakes, lowlands, etc.) at the time of the coal formation. Each basin has different detailed characteristics.
4. Problems of the Pennsylvanian of the United States: Tulsa Geol. Soc. Digest, v. 24, p. 56-61, illus., 1956. A resumé of the Pennsylvanian System of the United States includes that part in the Commonwealth. A small-scale isopach map is included.
5. Classification of Paleozoic coal measures [abs.]: Geol. Soc. America Bull., v. 70, p. 1693, 1959.

WANNER, HENRY ECHERT

1. Some additional faunal remains from the Trias of York County, Pennsylvania. Ph.D. thesis, Univ. Pa., 1926.

WARAKSA, IRENE R.

1. The petrology and structural geology of the pre-Cambrian igneous rocks near Wallace, Chester County, Pennsylvania. M. A. thesis, Bryn Mawr Coll., 1952.

WARD, FREEMAN, 1879-1943.

1. Sand and gravel in Bucks County. Unpublished manuscript, Pa. Geol. Survey, 1941. [not seen]

WARD, RICHARD F.

1. Petrology and metamorphism of the Wilmington Complex, Delaware [Delaware, Philadelphia Cos.], Pennsylvania, and Maryland: Ph.D. thesis, Bryn Mawr Coll., 1958; Geol. Soc. America Bull., v. 70, p. 1425-1458, illus. incl. geol. map, 1959. The Wilmington Complex is bordered by the Wissahickon Formation. The Complex is characterized by banding and foliation which are commonly parallel. Felsic material has replaced some of the mafic material by recrystallization. Detailed analyses are given.

WARMKESSEL, CARL ANDREW

1. (and Gault, H. R.). Chemical characteristics of the Jacksonburg Formation [southeastern Pa.] [abs.]: Geol. Soc. America Bull., v. 62, p. 1487-1488, 1951.

WARREN, CHARLES HYDE, 1876-1950.

1. Louis Valentine Pirsson, 1860-1919: Am. Acad. Arts and Science Proc., v. 68, p. 658-662, 1933.

[? WARREN, GEORGE]

1. The Cameron Coal Company, Cameron, Cameron County, Pennsylvania. . . . 40 p., illus., New York, Baker and Godwin, 1865. A prospectus includes reports on coal and iron ore by J. P. Lesley, N. F. Jones, P. W. Sheafer, and B. Needham. Analyses of the coal are included.

WARTHIN, ALDRED SCOTT, JR., *see* Cooper, G. A., 1.

WARSHAW, CHARLOTTE MARSH

1. The occurrence of jarosite in underclays [Allegheny, Somerset Cos.]: Am. Mineralogist, v. 41, p. 288-296, illus., 1956. Jarosite-family members are intimately mixed with clay minerals in underclays. Chemical and x-ray analyses were used to determine the material.

WASHABAUGH, MAJOR W., *see* Grasty, J. S., 1.

WASHINGTON, HENRY STEPHENS, 1867-1934.

1. Chemical analyses of igneous rocks published from 1884 to 1900 . . . : U. S. Geol. Survey Prof. Paper 14, 495 p., 1903. A discussion of a technique includes analyses of many rocks; those from the Commonwealth are from Franklin and Montgomery Cos.
2. Chemical analyses of igneous rocks published from 1884 to 1913, inclusive . . . : U. S. Geol. Survey Prof. Paper 99, 1201, p., 1917. Analyses and classification of rocks by the C.I.P.W. method are given for many from the southeastern counties.

WATSON, EDWARD HAHN, *see also* Clavan W., 1; Rosenzweig, A., 1; Willard, B., 3.

1. (and Wyckoff, D.). Guidebook illustrating the geology of the Philadelphia area [Chester, Delaware Cos.]: [Field] Conf. of Pa. Geologists 17th, Bryn Mawr College 1951, 34 p. (‡), illus., [n. p.] [1951]. This is a detailed, annotated, well-illustrated road log of a field trip visiting numerous exposures of Precambrian and Cambrian crystalline rocks. Baltimore Gneiss, gneiss of Mine Ridge, the Glenarm rocks, and various Cambrian formations are seen.
2. Crystalline rocks of the Philadelphia area [Chester, Philadelphia Cos.], *in* Geol. Soc. America Guidebook for field trips . . . , Field Trip no. 5, p. 153-158, illus., 1957. The Precambrian rocks are cursorily described. Radioactive age dates are given. Some of the rocks are lower Paleozoic. A road log is included.
3. Triassic faulting near Gwynned [Montgomery Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 32, p. 122-127, illus., 1958. A great number of small faults are exposed in a railroad cut; the average stratigraphic throw is about 5 feet, ranging from an inch to 62 feet; the cumulative throw is 305 feet. This cumulative effect, if considered over a large area, may be appreciable.

WATSON, THOMAS LEONARD, 1871-1924.

1. The rutile deposits of the eastern United States: U. S. Geol. Survey Bull. 580, p. 385-412, illus., 1915. Rutile has been found in Chester Co. in highly metamorphosed sedimentary rocks. It weathers out of Chickies Quartzite and Cambro-Ordovician limestone in several places.

WEAVER, CHARLES EDWARD

1. (and Bates, T. F.). K-bentonite of central Pennsylvania: Pa. State Coll. School of Mineral Industries Tech. Rept. 2, 20 p. (‡), illus., 1950. "Metabentonite"-like clay beds from Ordovician, Silurian, and Devonian rocks from

central Pennsylvania are described and analyzed. The clays have properties of both illite and montmorillonite. X-ray data are used to compare these clays with other known clays.

2. (and Bates, T. F.). Mineralogy and petrography of the Ordovician "metabentonites" and related limestones: Clay Minerals Bull., v. 1, p. 258-261, London, 1952. K-bentonites from the upper Black River and lower Trenton Formations of central Pennsylvania were analyzed by x-ray and differential-thermal analyses. The clay is mixed-layer, composed of montmorillonite and illite. Illite is present in the surrounding rock. The bentonite has a volcanic origin; volcanic ash was leached by sea water. Twenty per cent of the Ca was replaced by the K in the sea water.
3. Mineralogy and petrology of some Paleozoic clays from central Pennsylvania. Ph.D. thesis, Pa. State Coll., 1952.
4. A lath shaped non-expanded dioctahedral 2:1 clay mineral [Centre Co.]: Am. Mineralogist, v. 38, p. 279-289, illus., 1953. The clay is found disseminated in the Oswego graywacke and in one-to-six-inch beds of clay within the formation. Electron micrography, x-ray, differential-thermal, and chemical analyses are made.
5. Mineralogy and petrology of some Ordovician K-bentonites and related limestones [central Pa.]: Geol. Soc. America Bull., v. 64, p. 921-943, illus., 1953. Twenty-two samples of K-bentonite are described and analyzed in great detail by many techniques. The clay is altered volcanic glass. The volcanic ash deposited in the surrounding limestones is altered to chlorite. Analyses are made.
6. Mineralogy of the Middle Devonian Tioga K-bentonite [Clinton, Cameron, Erie Cos.]: Am. Mineralogist, v. 41, p. 359-362, illus., 1956. X-ray, differential-thermal, and chemical analyses of some K-bentonites show that they consist of randomly interstratified layers of illite and montmorillonite in approximately 4:1 to 3:1 ratios. They resemble Ordovician K-bentonites.

WEAVER, KENNETH NEWCOMER

1. The geology of the Hanover area, York County, Pennsylvania. Ph.D. thesis, Johns Hopkins Univ., 1955.

WEAVER, RICHARD, *see* Burtner, R., 1.

WEDOW, HELMUTH, JR., *see* Hawkes, H. E., Jr., 2.

WEIS, GEORGE F.

1. Cyclic sedimentation in the Pottsville Series of the Lawrence County area, Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1956.

WEITZ, JOHN HILLS, *see also* Bolger, R. C., 2.

1. (and Bolger, R. C.). Mineralogy and nomenclature of the Mercer fire clay in north-central [western] Pennsylvania: Pa. Acad. Sci. Proc., v. 25, p. 124-130, illus., 1951. A description of the geographic and stratigraphic setting of the clay beds is followed by a proposed classification, based on mineralogy, of the various types of Mercer clays. Claystone is the common type of Mercer rock; kaolinite, diaspore, and boehmite are the chief minerals. The mode of occurrence of each is described. Clinton, Centre, and Clearfield Cos. are the major sources.
2. The Mercer fire-clay in Clinton and Centre Counties, Pennsylvania. Ph.D. thesis, Pa. State Univ., 1954.

WELCH, STEWART W., *see also* Cohee, G. V., 1.

1. Radioactivity of coal and associated rocks in the anthracite fields of [north] eastern Pennsylvania: U. S. Geol. Survey Trace Elem. Inv. 348, 31 p. (‡), illus., 1953. Data from 150 samples of coal and 13 samples of shale from 46 locations are tabulated and show that the radioactive content of the area is too low to be of economic interest.

WELLER, JAMES MARVIN

1. Carboniferous trilobite genera: Jour. Paleontology, v. 10, p. 704-714, illus., 1936. *Kaskia chesterensis* is reported from the "Maxville" Limestone from somewhere in the Commonwealth. It is described and illustrated.

WELLER, STUART, 1871-1927.

1. A preliminary report on the stratigraphic paleontology of Walpack Ridge, in Sussex County, New Jersey: N. J. State Geologist Ann. Rept. 1899, p. 3-46,

illus., 1900. Lists of fossils from each of the Silurian and Devonian formations are given. Many of the fossils are from the Commonwealth.

2. Henry Shaler Williams, 1847-1918: Jour. Geology, v. 26, p. 698-700, 1918.

WELLS, DANA

1. Note on a mammoth tooth from gravels of the Monongahela River [Greene Co.]: W. Va. Acad. Sci. Proc. 1936, v. 10 (Univ. Bull. Ser. 38, no. 3-II), p. 122-123, 1937. A tooth of *Elephas primigenius* from river gravels, probably Pleistocene in age, is described.
2. Proboscidean teeth from gravel of the Monongahela River [Greene Co.]: W. Va. Acad. Sci. Proc. 1955, v. 27, p. 68-69, 1956. Molars from *Parelephus columbi* and *Mastodon americanus* from river gravel, probably Pleistocene in age, are described.

WELLS, ROGER CLARK, 1877-1944, *see also* Mills, R. van A., 1.

1. Analyses of rocks and minerals from the laboratory of the United States Geological Survey 1914-36: U. S. Geol. Survey Bull. 878, x, 134 p., 1937. The following are analyzed: igneous and metamorphic rocks from the Philadelphia and Quarryville [Lancaster Co.] areas; limestones from Somerset Co.; clay shale from Lycoming Co.; pyrite from Chester Co.; and antigorite from Northampton Co.

WENRICH, D. H.

1. Some early Philadelphia zoologists: Pa. Acad. Sci. Proc., v. 29, p. 22-35, 1955. Brief biographical sketches include those of many geologists of the southeastern counties of the Commonwealth. Leidy and Cope are extensively discussed.

WERNER, JAMES EDWARD

1. A porosity study of the Conococheague Dolomite near Leesport [Berks Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1951.

WESTGATE, LEWIS GARDNER, 1868-1948.

1. Memorial of Eugene Wesley Shaw [1881-1935]: Geol. Soc. America Proc. 1935, p. 311-318, port., 1936.

WETHERILL, CHARLES MAYER, 1825-1871.

1. Report on the iron and coal of Pennsylvania, *in* Appendix to carboniferous and ferriferous minerals. [15 p.], illus., [n. p.] [1853]. A reprint from some unknown publication outlines the coal, iron, and limestone sources for many of the blast furnaces operating in the Commonwealth at that time. Analysis are included.

WETHERILL, GEORGE W., *see* Tilton, G. R., 1.

WETMORE, ALEXANDER

1. Notes on certain grouse of the Pleistocene [Bedford Co.]: Wilson Bull., v. 71, p. 178-182, illus., 1959. Fragments of a sharp tailed grouse, *Pediocetes phasionellus,* are listed from the New Paris Sinkholes. This is the first record of the species in the eastern United States. No data are included.

WHERRY, EDGAR THEODORE, *see also* McLaughlin, D. B., 6.

1. Views at the old Perkiomen Copper mine [Chester Co.]: Mineral Collector, v. 14, p. 80, photos, 1907. Photographs show the evidence of the early mining activity in the area.
2. Contributions to the mineralogy of the Newark Group in [Montgomery Co.] Pennsylvania. Ph.D. thesis, Univ. Pa., 1909.
3. Successive geologic maps of Buckingham Mountain [Bucks Co.]: Pa. Acad. Sci. Proc., v. 33, p. 195-197, illus., 1959. The small mountain is held up by Chickies Quartzite. A sketch map shows the contacts with the surrounding rocks as mapped in 1893 by Lyman, in 1907 by Wherry, in 1931 by Bascom, and by the Pa. Geol. Survey in 1950. The 1907 map, he feels, is correct.

WHITCOMB, LAWRENCE

1. Correlation of Ordovician limestone at Salona, Clinton County, Pennsylvania. Ph.D. thesis, Princeton Univ., 1930.
2. J. Peter Lesley [1819-1903], geologist—what was his correct name?: Pa. Acad. Sci. Proc., v. 14, p. 31-34, 1940; summary with title, J. Peter Lesley [1819-1903] and Joseph Lesley, Science, v. 92, p. 530, 1940. This is a biographical discussion of the Chief Geologist of the Second Survey who used several different signatures on his publications. It includes an exhortation toward care.
3. New Ordovician bentonite information from Reedsville [Mifflin Co.], Pennsylvania: Pa. Acad. Sci. Proc., v. 28, p. 84-90, illus., 1954. New road cuts

permit re-evaluation of previously-described limestones and bentonites [1932]. Eight bentonite layers are exposed; seven are in the Salona Limestone and the uppermost one is in the overlying Coburn Limestone. That in the Coburn was erroneously placed in the Salona in 1932. The thicknesses of, and stratigraphic thicknesses between, the beds are discussed. The section is measured.

WHITE, CHARLES ABIATHAR, 1826-1910.

1. Memoir of Ferdinand Vandiveer Hayden, 1839-1887: Natl. Acad. Sci. Biog. Mem., v. 3, p. 395-413, port., 1893.

WHITE, CHARLES DAVID, 1862-1935, *see also* Lesquereux, L., 2.

1. James Macfarlane [1819-1885]: Am. Geologist, v. 7, p. 145-149, port., 1891.
2. Mr. [Ralph Dupuy] Lacoe's [1824-1901] relations to science: Wyoming Hist. and Geol. Soc. Proc. and Coll., v. 6, p. 55-60, 1901.
3. (and Theissen, R.). The origin of coal: U. S. Bur. Mines Bull. 38, x, 390 p., illus., 1913. The coal-forming process, from peat to anthracite, is described in detail. Examples are used to show each step; many examples are from the Commonwealth. Analyses are included.
4. Oil reserves of the United States: Am. Inst. Min. and Metall. Engineers Trans., v. 68, p. 953-958, 1923; preprint no. 1165, 6 p., 1922. There are 260 million 42-gallon barrels of oil remaining in the ground in the Commonwealth.
5. Progressive regional carbonization of coals: Am. Inst. Min. and Metall. Engineers Trans., v. 71, p. 253-279, illus., 1925; discussions, p. 280-281; preprint no. 1414, 27 p., illus., 1925. Many examples are taken from the Commonwealth to show the effects of temperature and pressure on the rank of coal.
6. Outstanding features of petroleum development in America: Am. Assoc. Petroleum Geologists Bull., v. 19, p. 469-502, 1935. A discussion of the historical development of the petroleum industry includes much information from the Commonwealth.
7. Some features of the early Permian flora of America: Internatl. Geol. Cong. 16th, U. S. 1933, Rept., v. 1, p. 679-689, illus., Washington, D. C., 1936. Without specific mention of the Commonwealth, he points out floral evidence for the Permian age of the Dunkard rocks. Permian genera from Europe migrated to North Amercia; otherwise, the flora resembles that of the underlying Pennsylvanian System.

WHITE, GEORGE WILLARD, *see also* Droste, J. B., 3, 6; Shepps, V. C., 3.

1. Lewis Evans' contributions to early American geology, 1743-1755: Ill. State Acad. Sci. Trans. 1951, v. 44, p. 152-158, 1952. Lewis Evans, an early cartographer, made many observations and speculations upon the origin and distribution of the Appalachian Mountains. Some of these observations are abstracted and reproduced.
2. (and others). Glacial deposits of northwestern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 68, p. 1902-1903, 1957.

WHITE, ISRAEL CHARLES, 1848-1927.

1. Report of progress in the Beaver River district of the bituminous coal fields of western Pennsylvania: Pa. Geol. Survey 2nd, [Bull] Q, li, 337 p., illus. incl. geol. map, 1878; discussion with title, On terrace levels in Pennsylvania, by J. P. Lesley: Am. Jour. Sci. 3d ser., v. 16, p. 68-69, 1878. A complete geologic description of the region is given. [Pennsylvanian] and Quaternary rocks are present. The structure is considered separately. Sections are measured; fossils are listed. Bituminous coal is the chief economic resource.
2. The geology of Pike and Monroe Counties: Pa. Geol. Survey 2nd, [Bull.] G 6, p. xxxiv, 1-333, 365-366, illus. incl. geol. map, 1882; discussion with title, Supposed glacial striae on Locust Mountain, Pa., by H. C. Lewis: Am. Jour. Sci. 3rd ser., v. 26, p. 483-484, 1883. A complete geologic description of the area is given. Silurian-[Pennsylvanian] rocks are at the surface. The structure exposed in the water gaps is described. The glacial geology is discussed. Sections are measured; fossils are listed. No economic resources are described.
3. Effects of the glacial dam at Cincinnati along the upper basin of the Ohio: Western Reserve Hist. Soc. Tract 60, p. 273-278, 1884. A lobe of the Wisconsin ice sheet crossed the Ohio River east of Cincinnati and backed up the Ohio River and its tributaries. This is reflected in the terraces of the Ohio and Monongahela Rivers in Pennsylvania and West Virginia.

4. (and others). The geology of Huntingdon County: Pa. Geol. Survey 2d, [Bull.] T-3, xv, 443 p., illus. incl. geol. map, 1885. A complete geologic description of the area is given. Ordovician-[Pennsylvanian] rocks are present. The structure is described in detail; folds are most evident. Faults are present. Sections are measured; fossils are listed; analyses are made. Coal and iron are the chief economic products.
5. The geology of natural gas: Petroleum Age, v. 5, p. 1263-1267, 1464-1465, Bradford, Pa., 1886. This is an outline of the anticlinal theory for the accumulation of natural gas. Many examples are taken from western Pennsylvania.
6. Stratigraphy of the bituminous coal fields of [western] Pennsylvania, Ohio, and West Virginia: U. S. Geol. Survey Bull. 65, 216 p., illus. incl. geol. map, 1891. This is a comprehensive study of the stratigraphic succession and economic geology of the [Pennsylvanian] and Permian rocks of western Pennsylvania. Sections are measured; fossils are listed.
7. The anticlinal theory: Am. Mining Cong. Rept. Proc. 19th Ann. Sess., p. 550-556, 1917. A review of the history of the theory includes personal reminiscences of activity within the Commonwealth and elsewhere.

WHITE, WALTER FINCH, JR., *see* Mangan, J. W., 2.

WHITE, WILLIAM ALEXANDER

1. Blue Ridge Front; [southeastern Pa.] a fault scarp: Geol. Soc. America Bull., v. 61, p. 1309-1346, illus., 1950. The present Blue Ridge scarp, from Georgia to New Jersey, has been produced by a late Tertiary normal fault. Evidence in the Commonwealth is reviewed and discussed.

WHITE, WILLIAM B.

1. McConnellstown Quarry Cave [Huntingdon Co.] (Pennsylvania): Speleo Digest 1957, pt. 1, p. 1-52 - 1-53 (‡), illus., 1958; reprinted *from* Netherworld News, v. 5, p. 106, 1957. A sketch map and brief description are given. It is in Helderberg Limestone.
2. (and Fischer, J. R.). Cavern development in the Vanport Limestone: Speleo Digest 1958, pt. 2, p. 2-14 - 2-19 (‡), 1959. A number of small caves "about 50 miles north of Pittsburgh" are described in detail.
3. (and Ellisher, A. M.). The occurrence of unusual minerals in Pennsylvania caves [abs.]: Netherworld News, v. 6, p. 77-82 (‡), illus., 1958; Speleo Digest 1958, pt. 2, p. 2-19 - 2-23 (‡), illus., 1959.

WHITFIELD, [? JAMES] E.

1. [Analysis of] Incrustation from casing of "Gravel-Bar Gas-Well", Kiskiminetas River, Armstrong County, Pennsylvania: U. S. Geol. Survey Bull. 27, p. 71, 1886. The substance is interesting because of its mode of occurrence and from the fact that after the deduction of its impurities, its composition approximates very closely the silicate Al_2O_3. $2SiO_2$.

WHITLOCK, HERBERT PERCY, 1868-1948.

1. Memorial of Edmund Otis Hovey [1862-1924]: Am. Mineralogist, v. 10, p. 58-60, port., 1925.

WHITTINGTON, HARRY BLACKMORE

1. The Trinucleidae, with special reference to North American genera and species: Jour. Paleontology, v. 15, p. 21-41, illus., 1941. *Cryptolithus tesselatus* from the Trenton and Salona Formations of Ordovician age in Centre and Clinton Cos., and *C. t.* var. *quadrilineus* from the Martinsburg Formation of Lebanon Co. are described and illustrated.

WHITTLESEY, DERWENT

1. Kirk Bryan, 1888-1950: Assoc. Am. Geographers Annals, v. 41, p. 89-94, port., 1951.

WILCOX, Q. L.

1. New Oriskany Sand gas pool [Leidy, Clinton Cos.]: Oil and Gas Jour., v. 49, no. 29, p. 91-93, illus., 1950. Gas occurs in the Oriskany Formation in the Leidy gas field. A cursory description of the geological background is included.

WILKENS, HANS

1. Notes on the geology of the Reading Hills—the Hardyston Quartzite in Berks County, Pa.: Pa. Acad. Sci. Proc., v. 29, p. 193-194, 1955. Pinite occurs at the base of the Cambrian System. This is overlain by a brown-weathering discontinuous conglomerate; this is overlain by several hundred feet of arkosic

quartzite, which is overlain locally by thin-bedded quartzite and shale. The jasper at the top is only slightly developed in Berks Co. The total thickness of the formation is estimated to be 750 feet.

2. An erosion surface in the Reading Hills, Berks County, Pennsylvania [abs.]: Pa. Acad. Sci. Proc., v. 31, p. 98, 1957.
3. Some terrace deposits in the Schuylkill Valley, Berks County, Pennsylvania [abs.]: Pa. Acad. Sci. Proc., v. 31, p. 99, 1957.

WILKERSON, ALBERT SAMUEL, *see* Tedrow, J. C. F., 1.

WILLARD, BRADFORD, *see also* Conlin, R. R., 1; Gray, C., 9; Howell, B. F., Sr., 2; Johnson, M. E., 4; McLaughlin, D. B., 6.

1. The stratigraphy and paleontology of the Delaware Water Gap [Monroe Co.]. Ph.D. thesis, Harvard Univ., 1923.
2. Continental Upper Devonian of northeastern Pennsylvania: Geol. Soc. America Bull., v. 47, p. 565-608, illus. incl. geol. map, 1936. The Mississippian Mauch Chunk and Pocono Formations are described, and their relations to the Catskill facies are discussed. Corrections are made in the 2nd Pennsylvania Survey work. Sections are measured; faunas and floras are listed. Correlation with the Allegheny Front area is suggested. The Devonian-Mississippian contact is identified.
3. (and McLaughlin, D. B., and Watson, E. H., and others). Geologic map of Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. C 9, Plate 2. Scale 1:62,500 (about 1 inch to 1 mile), 1950.
4. Mapping Pennsylvania's geology: Pa. Dept. Internal Affairs Monthly Bull., v. 18, no. 9, p. 4-8, 1950. An historical account of the development of the geological map of the Commonwealth. The various persons and organizations who participated are outlined.
5. (and Stevenson, R. E.). Northeastern Pennsylvania and central New York petroleum probabilities: Am. Assoc. Petroleum Geologists Bull., v. 34, p. 2269-2283, illus., 1950. The geologic section from the Ordovician System to the Pennsylvanian System is reviewed; structures and unconformities are discussed. The area has "potentialities worth recording for future use . . .".
6. Paleozoic continental phases of sedimentation in the northern Appalachians: Internatl. Geol. Cong. 18th, Great Britain 1948, Rept., pt. 4, p. 29-37, illus., London, 1950. A review of cycles of continental deposition in the eastern United States is given. Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, and Permian continental deposits from the Commonwealth are discussed.
7. Let's publicize geology: Pa. Acad. Sci. Proc., v. 25, p. 120-123, 1951. This is a review of the geology as it is being taught in the various colleges in the Commonwealth, and it includes an exhortation for more public relations.
8. Lower Oriskany contact in eastern Pennsylvania: Pa. Acad. Sci. Proc., v. 26, p. 71-77, illus., 1952. Generalized stratigraphic sections show that the Oriskany Sandstone rests upon beds of various ages. A gentle angular unconformity is suggested.
9. Stanley Holman Cathcart (1889-1953): Am. Assoc. Petroleum Geologists Bull., v. 37, p. 2444-2447, port., 1953.
10. Unsolved stratigraphic problems in northeastern Pennsylvania: Pa. Acad. Sci. Proc., v. 27, p. 106-113, 1953. Stratigraphic uncertainties, from Precambrian time through to the Pleistocene and Recent Epochs, are described.
11. Memorial to Stanley Holman Cathcart (1889-1953): Geol. Soc. America Proc. 1953, p. 97-99, port., 1954.
12. Unusual Cambrian pseudofossils from Northampton County, Pennsylvania: Pa. Acad. Sci. Proc., v. 28, p. 91-95, illus., 1954. Mudcracks in the Leithsville Formation and ripple marks in the Limeport Formation are described and illustrated. A shallow water origin for the rocks is suggested.
13. Cambrian contacts in [south] eastern Pennsylvania: Geol. Soc. America Bull., v. 66, p. 819-834, illus., 1955. The Cambrian formations, from oldest to youngest, are: Hardyston, Leithsville, Limeport, and Allentown. Contacts between all of them are described and discussed.
14. Oil potential in northern Appalachians: Petroleum Engineer, v. 27, no. 3, p. B59-B60, B62, B65, illus., 1955. A generalized description of the geology of the Commonwealth includes a discussion of the petroleum potential.

15. Triassic fanglomerate provenance [southeastern Pa.]: Pa. Acad. Sci. Proc., v. 30, p. 157-162, illus., 1956. A Silurian-terrane provenance for a New Jersey exposure is extrapolated to include part of the Commonwealth. Silurian fossils in pebbles indicate a north or northwest provenance.
16. Devonian section at Bowmanstown, [Carbon Co.], Pennsylvania: Am. Assoc. Petroleum Geologists Bull., v. 41, p. 2298-2311, illus., 1957. Almost continuous exposures from the Lower Devonian New Scotland Formation to the Upper Devonian Catskill Formation are described along the Pennsylvania Turnpike. The section is important for its completeness and because it bridges the gap along the strike between eastern and western Devonian sections.
17. (and Conlin, R. R., and Hoskins, D. M.). Guide to the highway geology from Harrisburg [Dauphin Co.] to Bald Eagle Mountain [Centre Co.]: Pa. Geol. Survey 4th ser., Bull. G 29, iv, 38 p., illus., 1958. A generalized description of the principles of geology is followed by a geological road log from Harrisburg northwestward along the Susquehanna and Juniata Rivers to Lewistown and thence westward to Bald Eagle Mountain at the Allegheny Front. Details on strip maps are given.
18. Lower Ordovician, Lehigh and Delaware Valleys [southeastern Pa.]: Pa. Acad. Sci. Proc., v. 32, p. 177-183, 1958. Lower Ordovician rock terminology is discussed. The name "Beekmantown" is abandoned and Coplay Formation is reintroduced. The Coplay type section is redescribed.
19. (and others). Geology and mineral resources of Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. C 9, xi, 243 p., illus. incl. atlas with geol. map, 1959. Includes papers by J. L. Freedman, B. Willard, D. B. McLaughlin, L. C. Peltier, and H. R. Gault which are cited individually.
20. Paleozoic sedimentary rocks, Chap. 3, *of* Willard, B., Geology and mineral resources of Bucks County, Pennsylvania: Pa. Geol. Survey 4th ser., Bull. C 9, p. 23-54, illus., with a section by H. B. Roberts, 1959. Cambrian and Ordovician limestone, sandstone, and shale are described in detail. Analyses are made; fossils are listed.

WILLIAMS, EUGENE GRIFFIN, *see also* Degens, E. T., 1, 2; Dutcher, R. R., 1; Nickelsen, R. P., 1.

1. Stratigraphy of the Allegheny Series of the Clearfield Basin, Clearfield County, Pennsylvania. Ph.D. thesis, Pa. State Univ., 1957; [abs.], Dissert. Abs., v. 17, p. 2982-2983, 1957.
2. (and Nickelsen, R. P.). Correlation of the Pottsville and Lower Allegheny Series in parts of Clearfield and Centre Counties: Pa. State Univ. Mineral Industries Exper. Sta. Bull. 71, p. 36-50, illus., 1958. The Brookville and Clarion 1, 2, and 3 coals are traced throughout the area. Refractory clays are present beneath some of them in some places. Five fossil zones have been established. Thickness and lithologic variations are due to local channelling or to the effect of growing structures. Sections are measured.
3. Fossil zones in the Pottsville and Allegheny rocks of western Pennsylvania [abs.]: Geol. Soc. America Bull., v. 69, p. 1662-1663, 1958.
4. Aspects of the paleogeography of the Coal Measures of western Pennsylvania: Mineral Industries, v. 28, no. 9, p. 1, 3-5, illus., 1959. Examples are taken from western Pennsylvania to demonstrate the technique of use and value of paleogeographic maps. Small-scale faunal distribution and cross-bedding maps illustrate interpretive procedures.
5. Relationship between stratigraphy and the occurrence of high-alumina Mercer clay in western Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1699-1700, 1959.

WILLIAMS, GEORGE HUNTINGTON, 1856-1894.

1. Johann David Schoepf [1752-1800] and his contributions to North American geology: Geol. Soc. America Bull., v. 5, p. 591-593, 1894. A brief biography of this world traveller includes references to his work in the Commonwealth.

WILLIAMS, HENRY SHALER, 1847-1918.

1. On the classification of the Upper Devonian: Am. Assoc. Adv. Sci. Proc., v. 34, p. 222-234, illus., 1886. Upper Devonian rocks in Ohio, southern New York, and Erie, Crawford, and McKean Cos., Pennsylvania, are described in detail. The faunas of many different measured sections are compared.

WILLIAMS, HOWELL

1. Prof. Bailey Willis [1857-1949]: Nature, v. 163, p. 519-520, London, 1949.

WILLIS, BAILEY, 1857-1949.

1. Ueberschiebungen in den Vereinigten Staaten von Nordamerika: Internatl. Geol. Cong. 9th, Vienna 1903, C. R., p. 529-540, Vienna, 1904. A general review of overthrusts in the United States, by types and locations, includes those of the Appalachian Mountains and the Commonwealth. No details are given.
2. Geological map of North America. 12 p., Scale 1 inch to 5 million inches, Internatl. Geol. Cong. 10th, Mexico, 1906; also French edition.
3. Memoir of Israel C[ook] Russell [1852-1906]: Geol. Soc. America Bull., v. 18, p. 582-592, port., 1908.
4. Prof. T[homas] C[hrowder] Chamberlin [1843-1928]: Nature, v. 122, p. 930-931, London, 1928.
5. Thomas Chrowder Chamberlin [1843-1928]: Sci. Monthly, v. 28, p. 89-91, port., 1929.
6. Memorial of Thomas Chrowder Chamberlin [1843-1928]: Geol. Soc. America Bull., v. 40, p. 23-45, port., 1929; Smithson. Inst. Ann. Rept. 1929, p. 585-594, port., 1930 [bibliography omitted].

WILSON, JAMES LEE, *see also* Balk, C. L., 1.

1. Franconian trilobites of the central Appalachians: Jour. Paleontology, v. 25, p. 617-654, illus., 1951. The Ore Hill Limestone member of the Gatesburg Formation in the Nittany Arch region bears the typical Mid-continent *Elvina* fauna with some additions. Just below this, the member bears a new trilobite faunule which has a few genera from the *Elvina* fauna but is different and more fully developed southward in the Cumberland Valley area in the Conococheague Limestone. The upper Ore Hill member contains a Croixan fauna much like that of the type area with some additions. Descriptions and illustrations are included.
2. Upper Cambrian stratigraphy in the central Appalachians [central Pa.]: Geol. Soc. America Bull., v. 63, p. 275-322, illus., 1952; discussion with title, Taxonomy of the trilobite genera *Lonchocephalus* and *Welleraspis,* by P. Tasch: Jour. Paleontology, v. 27, p. 745-748, illus., 1953. Trilobite zones show the upper part of the Elbrook and lowest part of the Conococheague Formations to be Dresbachian; the lower part of the Conococheague and the middle part of the Gatesburg Formations are Franconian. The upper part of the Gatesburg Formation is Trempealeauian. Sections are measured; fossils are listed.

WILSON, JOHN ANDREW

1. Ermine Cowles Case, 1871-1953: Soc. Vert. Paleontology News Bull. 40, p. 29-31, port., 1954.

WILSON, PHILO CALHOUN

1. Geology of the northern part of the Allensville Quadrangle [Centre, Huntingdon Cos.], Pennsylvania. M. S. thesis, Cornell Univ., 1950.

WILSON, THOMAS CARROLL

1. Structure and stratigraphy of the Chestnut Ridge anticline near Uniontown [Fayette Co.], Pennsylvania. M. S. thesis, Univ. Pittsburgh, 1936.

WIMMER, PETER

1. Invertebrate paleontology as observed in a Blair County stone quarry: Pa. Acad. Sci. Proc., v. 28, p. 311-313, illus., 1954. The Silurian-Devonian section, exposed in the Temple Beth Israel Quarry, is illustrated and described. This is a prize-winning paper presented by a high-school student.

WINCHELL, ALEXANDER, 1824-1891.

1. Notices and descriptions of fossils, from the Marshall Group of the western states, with notes of fossils from other formations: Am. Phil. Soc. Proc., v. 11, p. 245-260, 1871 [1870]. *Discina gallaheri, Lingula membranacea, Producta semireticulata, Chonetes pulchella, Hemipronites umbraculum, Orthis michelini, Spirifera carteri, Syringothyris typa,* and *Murchisonia* sp. are reported from along Shafer's Run in Venango Co. Some are discussed.

WINCHELL, NEWTON HORACE, 1839-1914.

1. [Alexander Winchell, 1824-1891]: Am. Geologist, v. 7, p. 195, 1891.
2. Edward Waller Claypole [1835-1901]: Am. Geologist, v. 28, p. 247-248, 1901.

WINTERMUTE, THOMAS J.

1. Stratigraphy of the Tonoloway and Keyser Limestones near Bedford [Bedford Co.], Pennsylvania. M. S. thesis, Pa. State Coll., 1952.

WISE, DONALD UNDERKOFLER, *see also* Burtner, R., 1.

1. A structural approach to the stratigraphy of the Conestoga Limestone [Lancaster Co.]: Pa. Acad. Sci. Proc., v. 27, p. 169-173, illus., 1953. A thickness of 3000 feet is calculated for the Ordovician Conestoga Limestone, measuring along the plunge of fold axes and using a flow-thickening factor of .70. Insoluble residues and other evidence point to a general sequence of a clastic basal portion, becoming less clastic through the middle of the formation, and more clastic and schistose toward the top.
2. An example of recumbent folding south of the Great Valley of Pennsylvania [Lancaster Co.]: Pa. Acad. Sci. Proc., v. 32, p. 172-176, illus., 1958. The Beekmantown Limestone at Rheems shows flow folds with closely spaced axial planes, indicative of considerable tectonic transport. The average dip is 30°; beds can be traced for 700 feet across the strike. The differential pressure effects during flow are discussed.

[? WOLFF, GEORGE DERING]

1. Description of valuable coal, iron ore, . . . lands in Somerset County, Pennsylvania, with geological reports by Profs. Lesley, Egleston, Rogers, Johnson . . . and others. 66 p., illus., Philadelphia, E. C. Markley and Son, 1865. A prospectus includes reports by the above geologists on the coal, iron ore, and limestone on the property.

WOLFF, JOHN ELIOTT, 1857-1940

1. Charles Richard Van Hise (1857-1918): Am. Acad. Arts and Science Proc., v. 55, p. 511-512, 1920.

WOLMAN, MARKLEY GORDON

1. Channel equilibria, Brandywine Creek, [southeastern] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 64, p. 1494, 1953.
2. The channel characteristics of Brandywine Creek [southeastern], Pennsylvania. Ph.D. thesis, Harvard Univ., 1953; with title, The natural channel of Brandywine Creek, [southeastern] Pennsylvania: U. S. Geol. Survey Prof. Paper 271, vi, 56 p., illus., 1955. Statistical studies of changes in width, depth, velocity, slope of water surface, suspended load, and roughness of the creek are made. The geological influences are discussed.

WOOD, GEORGE V.

1. Modal analyses of three "quartzites" [central Pa.] [abs.]: Geol. Soc. America Bull., v. 70, p. 1702, 1959.

WOOD, GORDON HARRY, JR., *see also* Arndt, H. H., 1.

1. (and others). Subdivision of Pottsville Formation in Southern anthracite field, [northeastern] Pennsylvania: Am. Assoc. Petroleum Geologists Bull., v. 40, p. 2669-2688, illus., 1956. The Pennsylvanian Pottsville Formation can be divided into, from top to bottom: the Sharp Mountain Member, the Schuylkill Member, and the Tumbling Run Member. All are sandstones and conglomerates with subordinate amounts of shale, siltstone, and coal. Sections are measured. The total thickness is over 1100 feet.
2. (and others). Geology of the northern half of the Minersville Quadrangle and a part of the northern half of the Tremont Quadrangle, Schuylkill County, Pennsylvania: U. S. Geol. Survey Coal Inv. Map C 43 (2 sheets). Scale 1:12,000 (1 inch to 1000 feet), with cross sections and text, 1958. A geologic map shows Mississippian-Pennsylvanian rocks, structural features, and coal outcrop areas. Uranium-mineral occurrences are described.
3. (and Arndt, H. H., and Kehn, T. M.). Structural features of the anthracite region of [northeastern] Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1770-1771, 1959.

WOOD, ROBERT H.

1. (and Richards, R. W.). George Burr Richardson (1872-1949): Am. Assoc. Petroleum Geologists Bull., v. 35, p. 2125-2127, port., 1951.

WOODHOUSE, JAMES

1. An account of the Perkiomen [Chester Co.] zinc mine, with an analysis of the ore: Baltimore Med. and Phys. Recorder, v. 1, p. 154-157, 1809. This is

an early account of the mine. [Sphalerite] is the most common mineral and contains some lead and iron.

WOODRING, WENDELL PHILLIPS

1. William Healy Dall, August 21, 1845-March 27, 1927: Natl. Acad. Sci. Biog. Mem., v. 31, p. 92-113, port., 1957.

WOODRUFF, JOHN GRANT

1. Geology of the Wellsville Quadrangle, New York: N. Y. State Mus. Bull. 326, 135 p., illus. incl. geol. map, 1942. Occasional references to occurrences of Devonian rocks in nearby Potter Co. are included.

WOODWARD, SIR ARTHUR SMITH

1. Eminent living geologists—Henry Fairfield Osborn [1857-]: Geol. Mag. 6th dec., v. 4, p. 193-196, port., London, 1917.

WOODWARD, HERBERT PRESTON

1. A review of the deep Appalachian structural basin: Am. Petroleum Inst. Proc., v. 34, sec. 4, p. 68-80, illus., 1954; revised, N. Y. Acad. Sci. Trans. 2nd ser., v. 17, p. 83-89, illus., 1954. A broad, generalized review of the Appalachian sedimentary and structural history includes that of the Commonwealth. The relationships of oil and gas to the geologic background are also considered.
2. Problems of the deep Appalachian basin: Petroleum Engineer, v. 27, no. 3, p. B50-B56, B58, port., 1955. This is a discussion, in the form of questions and answers, of the most significant problems of the Appalachian Basin, especially regarding petroleum potential. Those of the Commonwealth are included.
3. What is the geological potential for deep drilling in the Appalachian region?: Oil Forum, v. 9, no. 4, p. 118-120, illus., 1955. A review of the geology of the Appalachian Basin includes that of the Commonwealth. A plea for re-evaluation is made, based upon newly obtained information. No specific examples are included, however.
4. New look is needed in Appalachian Basin: World Oil, v. 142, no. 4, p. 96, 99-100, illus. incl. port., 1956. A generalized review of Appalachian Basin stratigraphy and structure includes that of Commonwealth. It includes an exhortation to expand testing to as-yet poorly tested structural areas.
5. The Appalachian region, *in* Guzmán Jiménez, E. J., ed., Symposium sobre yacimientos de petroleo y gas, t. 3, p. 327-349, illus., Internatl. Geol. Cong. 20th, Mexico, 1956; summary, World Oil, v. 145, no. 7, p. 110-112, 115, illus., 1957. A review of the Appalachian region includes the Commonwealth. The region is a stratigraphic and structural trough with a Precambrian rock floor. Most of the rocks show constant facies patterns with a primary eastern source and a mesial thickening. The structural basin changed its shape throughout the Paleozoic Era, culminating in post-Permian crumpling of the whole basin. Oil and gas occurrences and potentials are discussed. Blanket and lenticular sand-, carbonate-, and shale-reservoirs are discussed.
6. Structural elements of northeastern Appalachians [northeastern Pa.]: Am. Assoc. Petroleum Geologists Bull., v. 41, p. 1429-1440, illus., 1957. A period of post-Appalachian-Revolution-folding is postulated. The Acadian orogeny created north-south aligned axes, the Appalachian Revolution created east-northeast aligned axes, and a post-Appalachian, perhaps Early Triassic orogeny created north-south aligned axes on the latter.
7. Chronology of Appalachian folding: Am. Assoc. Petroleum Geologists Bull., v. 41, p. 2312-2327. 1957; discussion with title. Alleghany orogeny, by author, v. 42, p. 193, 1958. This is a discussion of sedimentary, structural. igneous and metamorphic records of folding in the Appalachian Mountains. Ante-Cambrian, Mid-Ordovician (Taconic), and continuous orogeny from the Devonian on, are recognized, culminating in what he calls the Alleghany orogeny at the end of the Paleozoic Era. The entire Commonwealth is included.
8. Emplacement of oil and gas in Appalachian Basin, *in* Weeks, L. G., ed., Habitat of oil—a symposium, p. 494-510, Tulsa, Am. Assoc. Petroleum Geologists, 1958. The geologic history of the Appalachian Geosyncline as a sediment trap is described. Petroleum hydrocarbons were also trapped and flowed upward and outward into local traps toward the edges during orogeny. The nature of the local traps is discussed.

9. The Appalachian region: World Petroleum Cong. 5th, New York 1959, Proc. sec. 1, p. 1061-1079, illus., with discussion, 1959. A review of the geological history and the nature of the petroleum occurrences includes those of the Commonwealth.

WOOLLARD, GEORGE PRIOR

1. Gravity studies of major tectonic units in the United States [abs.]: Geol. Soc. America Bull., v. 66, p. 1638, 1955.

WOOLMAN, LEWIS

1. Artesian wells: N. J. State Geologist Ann. Rept. 1900, p. 103-171, 1901. Included are summaries of well logs from wells drilled in Bucks and Northampton Cos.

WORTHEN, AMOS HENRY, 1813-1888, *see* Meek, F. B., 1.

WRATHER, WILLIAM EMBRY

1. Obituary, Rollin D. Salisbury [1850-1922]: Am. Assoc. Petroleum Geologists Bull., v. 6, p. 563-566, illus. incl. port., 1922.

WRAY, JOHN LEE

1. The Greenbrier series in northern West Virginia and its correlates in southwestern Pennsylvania. M. S. thesis, Univ. W. Va., 1951.
2. Mississippian Foraminifera from the central Appalachian region [southwestern Pa.] [abs.]: Dissert. Abs., v. 16, p. 1887, 1956.

WRIGHT, ARTHUR WILLIAMS, 1836-1915.

1. Biographical memoir of Benjamin Silliman, Jr., 1816-1885: Natl. Acad. Sci. Biog. Mem., v. 7, p. 115-141, port., 1911.

WRIGHT, FRANK JAMES, 1888-1954.

1. (and Chamberlin, W. A., and Ebaugh. W. C.). August F[rederick] Foerste [1862-1936]: Science, v. 83, p. 568, 1936.

WRIGHT, GEORGE FREDERICK, 1838-1921.

1. Additional evidence bearing upon the glacial history of the upper Ohio Valley [Lawrence Co.]: Am. Geologist, v. 11, p. 195-199, 1893. Evidence is taken from the Beaver River Valley to show that the gorge of the river, being filled with outwash material, is preglacial in age, and not interglacial.

WRIGHT, HAROLD D., *see* Bates, T. F., 2.

WRIGHT, WILLIAM

1. The oil regions of [northwestern] Pennsylvania. 275 p., illus., New York, Harper and Bros., 1865. A cursory description of the geomorphology and general geology of the region is included. A fascinating account of the times is given also.

WYCKOFF, DOROTHY, *see also* Watson, E. H., 1.

1. Metamorphic facies in the Wissahickon Schist near Philadelphia [Philadelphia Co.], Pennsylvania: Geol. Soc. America Bull., v. 63, p. 25-27, illus., 1952. The mica schists and mica gneisses are described in terms of metamorphic facies. Amphibolite-facies minerals predominate but show incipient alteration to epidote-albite-amphibolite-facies minerals. Strong regional deformation and copious hydrothermal solutions were involved in the metamorphism, which is now largely retrograde.

WYCOFF, RALPH W. G.

1. (and Greig, J. W., and Bowen, N. L.). The x-ray diffraction patterns of mullite and sillimanite [from Delaware Co.]: Am. Jour. Sci. 5th ser., v. 11, p. 459-472, illus., 1926. Sillimanite from Delaware Co., with other material from other places, is used to demonstrate the physical techniques in the mineral discrimination.

WYER, SAMUEL S.

1. The Smithsonian Institution's study of natural resources applied to Pennsylvania's resources. p. 86-91, 109-112, U. S. Natl. Mus., 1922. The text is purely geographical, but maps of various mineral resources, with county distinctions, are included. Limestone, glass sand, cement stone, sand and gravel, and clay are shown.

YEAKEL, LLOYD, *see also* Gault, H. R., 4.

1. Geology of the ore body at Warwick [Chester Co.], Pennsylvania, and vicinity. M. S. thesis, Northwestern Univ., 1955.
2. Early Silurian and Late Ordovician paleocurrents in the central Appalachians [abs.]: Geol. Soc. America Bull., v. 69, p. 1667-1668, 1958.

YELONSKY, ANDREW, *see* Wood, G. H., Jr., 1, 2.

YODER, E. J., *see* Shurig, D. G., 1.

YOUNG, WILLIAM HARVEY

1. (and Anderson, R. L.). Thickness of bituminous-coal and lignite seams mined in the United States in 1945: U. S. Bur. Mines Inf. Circ. 7442, 17 p. (‡), illus., 1947. The Commonwealth has 6% of its coal in beds over 8 feet thick, 26% in 6-8 foot thick beds, 32% in beds 4-6 feet thick, and 36% in beds less than 4 feet thick.

ZANDLE, GERALD L., *see* Bromery, R. W., 2, 3, 4, 5, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19.

ZIETZ, ISIDORE, *see also* Vacquier, V., 1.

1. (and Gray, C.). Geophysical and geological interpretation of a Triassic structure in [south] eastern Pennsylvania [abs.]: Geol. Soc. America Bull., v. 70, p. 1705, 1959.

ZODAC, PETER

1. Beraunite-cacoxenite locality in [Northampton Co.] Penn.: Rocks and Minerals, v. 28, p. 12, 1953. Directions to the location and a description of the minerals are given.

ANONYMOUS, I. M.

1. Coal discovered in [Luzerne Co.] Pennsylvania: Am. Med. and Phil. Register, v. 1, p. 117-118, 1811. This is one of the first reports of the existence of anthracite in the Commonwealth.
2. A brief description of the property belonging to the Lycoming Coal Company [Lycoming Co.] . . . . 32 p., illus., Poughkeepsie, N. Y., P. Potter, 1828. This is a report designed to accompany a prospectus. Bituminous coal, iron, and the possibility of salt are mentioned.
3. The great coal measures: Literary Record and Jour. Linnean Soc. Pa. College, v. 2, p. 147-150, 1844. This is a popular account of the occurrence of coal in western Pennsylvania.
4. A visit to the Schuylkill [Co.] coal region: Literary Record and Jour. Linnean Soc. Pa. College, v. 4, p. 1-6, 40-44, 1847-1848. An account of the [Pennsylvanian] strata and coal beds is given in the Swatara Coal Basin area. Few new data are included.
5. Geological map of the United States of America. Scale, 1 inch to 250 miles, G. W. and C. B. Colton Co., New York, 1867.
6. Sketch of Benjamin Silliman [Sr.] [1779-1864]: Pop. Sci. Monthly, v. 16, p. 550-553, 1880.
7. Sketch of the life of David Dale Owen, M. D. [1807-1860]: Am. Geologist, v. 4, p. 65-72, port., 1889.
8. Fireclay—a study of the clays of Clinton County, Pa.—what constitutes fireclay—how is it deposited?: Mines and Minerals, v. 24, p. 378-379, 1904. This is a semi-popular account of the material. The variableness of the clay beds is in marked contrast to the relative persistence of the often-overlying coal. One pure seam in Clinton Co. is not associated with coal and is discussed in more detail. It is of a sedimentary origin, very pure, and extensive.
9. Samuel Hubbard Scudder [1837-1911] . . .: Appalachia, v. 12, p. 276-279, 1911.
10. Eminent living geologists; Charles Doolittle Walcott [1850-]: Geol. Mag. 6th dec., v. 6, p. 1-10, London, 1919.
11. An eminent living American geologist and paleontologist—Professor John M[ason] Clarke [1857-]: Geol. Mag., dec. 6, v. 58, p. 292-294, port., London, 1921.
12. Obituary [Edmund Otis Hovey, 1862-1924] Am. Jour. Sci. 5th ser., v. 8, p. 445, 1924.
13. In memoriam, John Mason Clarke, 1857-1925: N. Y. State Mus. Bull. 267, p. 7-11, port., 1926.
14. A bibliography of the published works of Thomas Chrowder Chamberlin (1843-1928): Jour. Geology, v. 37, p. 380-392, 1929.
15. [Charles David White, 1862-1935]: Wash. Acad. Sci. Jour., v. 25, p. 155, 1935.
16. Prof. W[illiam] J[ohn] Sinclair [1877-1935]: Nature, v. 135, p. 645, London, 1935.
17. August Frederick Foerste [1862-1936]: Wash. Acad. Sci. Jour., v. 26, p. 266, 1936.

18. Edward Salisbury Dana [1849-1935]: Mineralogist, v. 4, no. 3, p. 20, 22, 1936.
19. Heinrich Ries [1871-]: Am. Ceramic Soc. Bull., v. 17, p. 490-491, port., [on cover], 1938.
20. [Map showing] Coal reserves of Pennsylvania: Pennsylvania Planning, v. 2, no. 5, p. 10-11, 1938. A map gives a pictorial representation of original extent of coal deposits, recoverable coal, and mined coal by county.
21. George Herbert Girty [1869-1939]: Wash. Acad. Sci. Jour., v. 29, p. 187, 1939.
22. Arno Carl Fieldner: Am. Ceramic Soc. Bull., v. 21, p. 186-187, port., 1942.
23. W[illiam] A[nton] J[osephius] M[aria] van Waterschoot van der Gracht [1873-1943]: Mines Mag., v. 33, p. 676-677, 1943.
24. George Otis Smith [1871-1944]: Mining and Metallurgy, v. 25, p. 49, 1944.
25. Limonite pseudos in [Lancaster, York Cos.] Pennsylvania: Rocks and Minerals, v. 21, p. 421, 1946. A popular account of the limonite pseudomorphous cubes from pyrite from the limestones is given.
26. Obituary, Nelson Horatio Darton [1865-1948]: Geog. Review, v. 38, p. 506-507, 1948.
27. Society's last surviving charter member dies [Heinrich Ries, 1871-1951]: Am. Ceramic Soc. Bull., v. 30, p. 195, port., 1951.
28. Aitkin Cave, Siglerville, Armagh Twp., Mifflin Co., Pa.: Nittany Grotto Newsletter, v. 1, no. 2, [p. 7, 8 (‡)], illus., 1952. A brief description of the cave includes a sketch map.
29. McClure Cave, McClure, West Beaver Twp., Snyder Co., Pa.: Nittany Grotto Newsletter, v. 1. no. 2 [p. 7, 8 (‡)], illus., 1952. A sketch map is included with a brief description of the cave.
30. Nails #1 Cave . . . Mifflin Co. . . . : Nittany Grotto Newsletter, v. 1, no. 3, p. 7, 8 (‡), illus., 1952. A brief cave description includes a sketch map.
31. Veiled Lady Cave . . . Centre Co., Penna.: Nittany Grotto Newsletter, v. 1, no. 3, p. 7-8 (‡), illus., 1952. A brief description of this once-commercial cave includes a sketch map.
32. Brubaker Cave . . . Mifflin Co. . . . : Nittany Grotto Newsletter, v. 1, no. 7, p. 9, 10 (‡), illus., 1953. A description of this cave, once called McNitt Cave, includes a sketch map.
33. Kooken's Cave . . . Huntingdon Co. . . . : Nittany Grotto Newsletter, v. 1, no. 7, p. 9, 10 (‡), illus., 1953; Speleo Digest 1958, pt. 1, p. 1-14 – 1-18 (‡), illus., 1959. A brief description of the cave includes a sketch map.
34. Nolls Cave . . . Centre County . . . : Nittany Grotto Newsletter, v. 1, no. 6, p. 7, 8 (‡), illus., 1953. A brief description of the cave includes a sketch map.
35. Rockview Cave . . . Centre Co. . . . : Nittany Grotto Newsletter, v. 1, no. 5, p. 5, 6 (‡), illus., 1953. A sketch map accompanies a brief description of the cave.
36. Seawra Cave . . . Mifflin County . . . : Nittany Grotto Newsletter, v. 1, no. 6, p. 7, 8 (‡), illus., 1953. A brief description of the cave includes a sketch map.
37. The Milroy Caves . . . Mifflin Co., Pa.: Nittany Grotto Newsletter, v. 1, no. 4, p. 6-8 (‡), illus., 1953. The caves, in Trenton Limestone, are described in considerable detail. A sketch map is included.
38. Tytoona Cave . . . Blair Co. . . . : Nittany Grotto Newsletter, v. 1, no. 5, p. 5, 6 (‡), illus., 1953. A description of the cave includes a sketch map.
39. Goss Cave . . . Mifflin Co. . . . : Nittany Grotto Newsletter, v. 2, no. 4, p. 9-10 (‡), illus., 1954. This cave is briefly described; a sketch map is included.
40. Biographical sketch of Dr. Reinhardt Theissen [1867-1938]: U. S. Bur. Mines Bull. 550, p. iii-iv, 1956.
41. Bituminous coal names: Pa. Dept. Internal Affairs Monthly Bull., v. 24, no. 10, p. 26, 27, 29, 1956. Names and synonyms of coal beds are listed. There are 36 valid names in use in Pennsylvania.
42. Trip I, [Crystalline rock relationships, Bucks Co.], *in* Field Conf. of Pa. Geologists 22d, Trenton, N. J. 1956, p. 41-44 (‡), illus., [n. p.] [1956]. Exposures of Baltimore Gneiss are visited on a field trip which includes stops in Bucks Co. An illustrated, annotated road log is included. The Chickies Quartzite-Baltimore Gneiss contact is studied. The gneiss has granite pegmatite intrusions in it. A fault contact of the Chickies Quartzite and the Wissahickon Schist is also described.

43. Trip 4 [Type section of Limeport Formation, Bucks Co.], *in* Field Conf. of Pa. Geologists 22d, Trenton, N. J. 1956, p. 60-62 (‡), illus., [n. p.] [1956]. A field trip stop at the Limeport Formation in Bucks Co. is described briefly; a section is measured.
44. Chisel Cave . . . Centre County: Nittany Grotto Newsletter, v. 6, p. 32-33 (‡), illus., 1957; Speleo Digest 1957, pt. 1, p. 1-62 - 1-63 (‡), illus., 1958. Chisel Cave, relatively new, is in Trenton Limestone. It is described and is sketch-mapped.
45. Kooken Cave, Huntingdon Co. . . . : Nittany Grotto Newsletter, v. 5, no. 9, p. 4-6 (‡), illus., 1957. A brief description of the cave includes three very detailed sketch maps.
46. Henry A[ugustus] Pilsbry [1862-1957]—he ploughed his own acre to the end: Frontiers, v. 22, p. 87, port., 1958.
47. In memoriam, John Reed Moseley, September 10, 1900-April 1, 1959, *in* Michigan Basin Geol. Soc. Guidebook Ann. Excursion June 1959, p. [v], 1959.
48. Peipers Cave, Cumberland County . . . : Speleo Digest 1958, pt. 1, p. 1-66 – 1-69 (‡), illus., 1959. A description of a big cave includes a sketch map.

INDEX, BY COUNTY, SUBJECT, AND GEOLOGIC AGE

ADAMS COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
- meteorites: Brezina, A., 1; Clarke, F.W., 5; Farrington, O.C., 2, 3; Henderson, E.P., 1
- *Areal geology*
  - Carlisle Quad.; Stose, G.W., 4
- *Economic geology*
  - clay, Carlisle Quad.: Stose, G.W., 4
  - iron, Carlisle Quad.: Stose, G.W., 4
  - manganese, Carlisle Quad.: Stose, G.W., 4
- *Groundwater*
  - springs: Scherer, P., 1
- *Historical geology*
  - Precambrian-Triassic, Carlisle Quad.: Stose, G.W., 4
- *Maps*
  - geologic, Carlisle Quad.: Stose, G.W., 4
- *Paleontology*
  - Reptilia, Triassic: Baird, D., 1
- *Physical geology*
  - flowage in folds: Cloos, E., 3
- *Physiographic geology*
  - Gettysburg battlefield area: Varody, E.H., 1

ALGAE
- Centre Co., Cambrian: Tasch, P., 2
- Franklin Co., Ordovician: Neuman, R.B., 1
- Pennsylvania, Paleozoic: Fenton, C.L., 1

ALLEGHENY COUNTY, *see also* Pennsylvania, Pennsylvania-Southwestern, and Pennsylvania-Western
- meteorites: Brezina, A., 1; Cohen E., 1; Farrington, O.C., 2, 3; Henderson, E.P., 2; Shepherd, C.U., 1
- *Economic geology*
  - coal, bituminous: Antisell, T., 1
    - Freeport-New Kensington Quads.: Koppe, E.F., 3
    - reserves: Wallace, J.J., 1
  - limestone: Antisell, T., 1
- *Engineering geology*
  - Crooked Creek dam site: Philbrick, S.S., 1
  - faulting and engineering problems: Ferguson, H.F., 1
  - guidebook: Philbrick, S.S., 3
  - landslides: Ackenheil, A.C., 1
  - problems: Melvin, J.H., 1
  - tunnel portal stability: Ackenheil, A.C., 2
- *Geophysical investigations*
  - radiocarbon dating: Arnold, J.R., 1; Libby, W.F., 1; Suess, H.E., 1
- *Ground water*
  - Pittsburgh area: Noecker, M., 1; Van Tuyl, D.W., 1, 2
    - popular: Van Tuyl, D.W., 4
  - springs: Daubeny, C., 1; Haywood, J.K., 1
- *Historical geology*
  - Pennsylvanian: Frazier, S.B., 1; Sheafer, W.L., 3d, 1; Tindell, W.N., 1
    - Freeport Quad.: Koppe, E.F., 1
    - freshwater limestone: Adams, H.J., 1
  - Pleistocene: Suess, H.E., 1
- *Mineralogy*
  - jarosite: Warshaw, C.M., 1
  - wurzite-like minerals: Frondel, C., 1; Seaman, D.M., 1
- *Paleontology*
  - Amphibia, Pennsylvanian: Romer, A.S., 3; Vaughan, P.P., 1
  - Gastropoda
    - Pennsylvanian: Meek, F.B., 1
    - Pleistocene: MacMillan, G.K., 1
  - Pelecypoda
    - Pennsylvanian: Doney, H.H., 1
    - Pleistocene: MacMillan, G.K., 1
  - Pisces
    - Mississippian: Newberry, J.S., 2
    - Pennsylvanian: Romer, A.S., 3
  - Reptilia, Pennsylvanian: Case, E.C., 1
- *Petrology*
  - coal, bituminous: Theissen, R., 3
  - Conemaugh Formation: McWilliams, G.R., 1; Ross, R.B., 1
  - Freeport Coal: Davis, J.D., 1
    - parting: Koppe, E.F., 1
  - freshwater limestone, Conemaugh-Allegheny Formations: Adams, H.J., 1
  - heavy minerals, Connellsville Sandstone: Demshar, L.S., 1
- *Physical geology*
  - faults: Ferguson, H.F., 1
  - weathering, Pittsburgh Coal: Porter, H.C., 1
- *Physiographic geology*
  - glacial geology: Shaw, E.W., 1

ALLUVIUM
- Northern Pennsylvania, Susquehanna River: Millette, J.F.G., 1

AMMONOIDEA, *see also* Invertebrata
- Bradford Co., Devonian: Hall, J., 10
- Luzerne Co., Pennsylvanian: Chow, M.M., 1

AMPHIBIA, *see also* Vertebrata
- Allegheny Co., Pennsylvanian: Romer, A.S., 3; Vaughan, P.P., 1
- Beaver Co., Pennsylvanian: Moodie, R.L., 1, 2
- Bucks Co., Triassic: Colbert, E.H., 1
- Chester Co., Triassic: Branson, E.B., 1; Colbert, E.H., 1; Cope, E.D., 1, 2
- Greene Co., Permian: Romer, A.S., 3; Vaughan, P.P., 1
- Montgomery Co., Triassic: Huene, F. von, 2
- Southwestern Pennsylvania, Pennsylvanian-Permian: Romer, A.S., 2
- Washington Co., Permian: Romer, A.S., 3
- Western Pennsylvania, Pennsylvanian: Cope, E.D., 1
- Westmoreland Co., Pennsylvanian: Hitchcock, E., 1
- York Co., Triassic: Branson, E.B., 1

ANALYSES
- basalt, Montgomery Co.: Washington, H.S., 1
- bentonite, Ordovician, Centre Co.: Weaver, C.E., 5
- carbonate rocks, Berks-Bucks Cos.: Gault, H.R., 2
- chromite, Lancaster Co.: Dieffenbach, O., 1
- clay, Northumberland Co.: Clarke, F.W., 1
- coal, Pennsylvania: Aresco, S.J., 1, 2, 3, 4, 5, 6, 7, 8; Fieldner, A.C., 1, 3; Parker, E.W., 1; Pope, G.S., 2; Snyder, N.H., 2; Wetherill, C.M., 1; White, C.D., 3
  - *Anthracite*
    - Northeastern Pennsylvania: Cooper, H.M., 1; Turner, H.G., 3
    - Schuylkill Co.: Rogers, H.D., 1
  - *Bituminous*
    - Allegheny Co.: Davis, J.D., 1; Wallace, J.J., 1
    - Armstrong Co.: Dowd, J.J., 3
    - Cambria Co.: Dowd, J.J., 1
    - Cameron Co.: Warren, G., 1
    - Centre Co.: Kirgis, F.L., 1
    - Clarion Co.: Blaylock, D.W., 2
    - Clearfield Co.: Blaylock, D.W., 1; Hotchkiss, J., 1
    - Elk Co.: Jackson, C.T., 1; Northwestern Pennsylvania Oil and Coal Co., 1
    - Fayette Co.: Dowd, J.J., 4
    - Greene Co.: Wallace, J.J., 3
    - Indiana Co.: Dowd, J.J., 2; Fieldner, A.C., 4; Foster, W.B., 1
    - Jefferson Co.: Dowd, J.J., 6
    - Lycoming Co.: Hodge, J.T., 1; Rogers, H.D., 1
    - McKean Co.: Colton, J.C., 1; Owen, D.D., 1
    - Somerset Co.: Campbell, M.R., 4, 7; Ferguson, J.H., 1; Union Coal Co., 1; Wallace, J.J., 2
    - Southwestern Pennsylvania: Eavanson, H.N., 1
    - Sullivan Co.: Campbell, M.R., 4
    - Washington Co.: Campbell, M.R., 5; Wallace, J.J., 4
    - Western Pennsylvania: Campbell, M.R., 6; Davis, J.D., 2; Fieldner, A.C., 2; Harr, L., 1; Johnston, J.K., 1; Parks, B.C., 1; Pope, G.S., 1; Snyder, N.H., 1
    - Westmoreland Co.: Dowd, J.J., 5; Lesley, J.P., 4
- connate water, Washington Co.: Steiger, G., 1
- diabase, Lebanon Co.: Edie, R.W., 1
- fire clay, Northern Pennsylvania: Bolger, R.C., 1
- gas-well incrustation, Armstrong Co.: Whitfield, J.E., 1
- ground water
  - Dauphin Co.: Foose, R.M., 1
  - Washington Co.: Clarke, F.W., 7
  - Western Pennsylvania: Mills, R. van A., 1
  - Westmoreland Co.: Kidwell, C.H., 1
- igneous rocks, Southeastern Pennsylvania: Washington, H.S., 2; Wells, R.C., 1
- iron ore
  - Clearfield Co.: Hotchkiss, J., 1
  - Elk Co.: Jackson, C.T., 1
  - Juniata Co.: Tyson, P.T., 1
  - Lycoming Co.: Hodge, J.T., 1
  - McKean Co.: Owen, D.D., 1
  - Pennsylvania: Bell, I.L., 2; Einecke, G., 1; Wetherill, C.M., 1
  - Perry Co.: Swartz, F.M., 12
  - Somerset Co.: Union Coal Co., 1
  - Southeastern Pennsylvania: Frazer, P., Jr., 3
- limestone
  - Clearfield Co.: Hotchkiss, J., 1
  - Cumberland Co.: Clarke, F.W., 4
  - Elk Co.: Jackson, C.T., 1
  - Franklin Co.: Swartz, F.M., 9
  - Pennsylvania: Wetherill, C.M., 1
  - Somerset Co.: Union Coal Co., 1
  - Southeastern Pennsylvania: Frazer, P., Jr., 3; Warmkassel, C.A., 1
- metamorphic rocks, Southeastern Pennsylvania: Wells, R.C., 1
- meteorite, Adams Co.: Clarke, F.W., 5
- minerals
  - Pennsylvania: Clarke, F.W., 8
  - Southeastern Pennsylvania: Clarke, F.W., 6; Wells, R.C., 1

- natural gas, Western Pennsylvania, helium: Anderson, C.C., 1; Boone, W.J., Jr., 1
- nephrite, Northampton Co.: Clarke, F.W., 1
- petroleum
  - McKean Co.: Feldman, J., 1
  - Western Pennsylvania: Lane, E.C., 1; Mabery, C.F., 1
- rocks, Pennsylvania: Clarke, F.W., 8
- sandstone, Dauphin Co.: Clarke, F.W., 4
- springs
  - Adams Co.: Scherer, P., 1
  - Bucks Co.: Normandie, J., 1
  - Pennsylvania: Bell, J., 1; Crook, J.K., 1
- stone, Pennsylvania: Eckel, E.C., 1
- tremolite, Northampton Co.: Clarke, F.W., 1
- uranium-bearing rocks, Carbon Co.: Klemic, H., 2
- vermiculite, Northampton Co.: Catlett, C., 1; Clarke, F.W., 1
- volcanic rocks, Franklin Co.: Washington, H.S., 1

ANGLESITE, *see also* Mineralogy
- Chester Co.: Genth, F.A., 1

ANORTHITE, *see also* Mineralogy
- Chester-Lancaster Cos.: Silliman, B., Jr., 1

ANORTHOSITE, *see also* Igneous rocks
- Chester Co.: O'Neill, B.J., Jr., 1
- Southeastern Pennsylvania: Smith, I.F., 1

ANTHOZOA
- Bedford Co., Devonian: Swartz, C.K., 1
- Blair Co., Ordovician: Bassler, R.S., 4
- Centre Co., Ordovician: Bassler, R.S., 4
- Eastern Pennsylvania, Ordovician: Bassler, R.S., 4; Okulitch, V.J., 1
- Franklin Co., Ordovician: Bassler, R.S., 4; Neuman, R.B., 1
- Mifflin Co., Ordovician: Bassler, R.S., 4
- Pennsylvania, Devonian: Bassler, R.S., 4
- Western Pennsylvania, Pennsylvanian: Bassler, R.S., 4

ANTICLINES, *see also* Structural Geology
- Chestnut Ridge anticline
  - Clearfield Co.: Bolger, R.C., 3
  - Fayette Co.: Wilson, T.C., 1
  - Greene-Washington Cos.: Sherrill, R.E., 1
- Driftwood anticline, Elk Co.: Bolger, R.C., 3

ANTIGORITE, *see also* Mineralogy
- Lancaster Co.: Glass, J.J., 1

APPALACHIAN GEOSYNCLINE
- Paleozoic history: Kay, G.M., 3, 5
- Pennsylvania: Lebling, C., 2

APPALACHIAN MOUNTAINS
- Pennsylvania: Rafinesque, C.S., 4, 7; Rich, J.L., 2; Rodgers, J., 2; Rogers, H.D., 5; Schottenlocher, R., 1; Spieker, E.M., 1
  - alpine structures: Lombard, A.E., 1

ARAGONITE, *see also* Mineralogy
- Pennsylvania: White, W.B., 3

ARMSTRONG COUNTY, *see also* Pennsylvania, and Pennsylvania-Western
- *Economic geology*
  - coal, bituminous
    - Freeport Quad.: Koppe, E.F., 3
    - reserves: Dowd, J.J., 3
  - petroleum: Lesley, J.P., 9
- *Geophysical investigations*
  - gamma ray log, Mississippian sandstone, Elders Ridge Quad.: Payne, F.R., Jr., 1
- *Groundwater*
  - gas-well incrustation: Whitfield, J.E., 1
- *Historical geology*
  - Pennsylvanian: Burke, J.J., 1; Fleck, W.P., 1
    - Freeport Quad.: Koppe, E.F., 1
    - Kittanning-Freeport area: Raine, J.W., 3d, 1
- *Maps*
  - economic
    - coal, bituminous: Dowd, J.J., 3
    - limestone: Ames, J.A., 2
- *Mineralogy*
  - gas-well incrustation: Whitfield, J.E., 1
- *Paleontology*
  - seed pod, Pennsylvanian, popular: Hamilton, H.V., 3
  - spores, Pennsylvanian: Riffelmacher, W.E., 1
- *Petrology*
  - Freeport coal parting: Koppe, E.F., 1
- *Physiographic geology*
  - caves: Dunn, J.R., 4; White, W.B., 2

AVES, *see also* Vertebrata
- Bedford Co., Pleistocene: Wetmore, A., 1

BACTERIA
- Schuylkill Co., Pennsylvanian: Farrell, M., 1; Lipman, C.B., 1

BARITE, *see also* Mineralogy
- Beaver Co.: Boyé, M.H., 2
- Bucks Co.: Gault, H.R., 5
- Fulton Co.; Socolow, A.A., 19

BASALT, *see also* Igneous rocks
- Lebanon Co., Ordovician: Moseley, J.R., 6
- Montgomery Co., analysis: Washington, H.S., 1

BEAVER COUNTY, *see also* Pennsylvania, Pennsylvania-Southwestern, and Pennsylvania-Western
- *Economic geology*
  - radioactive minerals: Ferm., J.C., 2
- *Engineering geology*
  - guidebook: Philbrick, S.S., 3
- *Groundwater*
  - Beaver Co.: Van Tuyl, D.W., 3
- *Maps*
  - economic, limestone: Ames, J.A., 2
  - geological: Van Tuyl, D.W., 3
- *Mineralogy*
  - barite: Boyé, M.H., 2
- *Paleontology*
  - Amphibia, Pennsylvanian: Moodie, R.L., 1, 2
  - Eurypterida, Pennsylvanian: Cope, E.D., 4, 6; Kjelleswig-Waering, E.N., 1, 2; O'Connell, M., 1
  - fungus, Pennsylvanian: Lesquereux, L., 1
  - Insecta, Pennsylvanian: Handlirsch, A., 1
  - Pisces, Pennsylvanian: Cope, E.D., 4, 6
  - seed pod, Pennsylvanian, popular: Hamilton, H.V., 3
  - spores, Pennsylvanian: Ferm, J.C., 1
- *Physiographic geology*
  - glacial features: Preston, F.W., 1

BEDFORD COUNTY, *see also* Pennsylvania and Pennsylvania-Western
- *Areal geology*
  - Evitts Creek Quad.: Norwood, E.M., Jr., 1
- *Economic geology*
  - coal, bituminous: Roberts, W.F., 4; Shepherd, F., 1
  - iron: Roberts, W.F., 4; Shepherd, F., 1
  - limestone: Roberts, W.F., 4
  - manganese: Hoffman, J.N., 1
- *Engineering geology*
  - Hollidaysburg Quad.: U. S. Geol. Survey Engineering Geology and Ground Water Branches, 1
  - tunnel strength: Gilbert, G.K., 1
- *Ground water*
  - springs: Haywood, J.K., 1
- *Historical geology*
  - Devonian: Prosser, C.S., 1
    - Bedford Quad.: Turley, M.R., 1
  - Mississippian, Bedford Quad.: Terriere, R.T., 1
  - Silurian: Swartz, C.K., 4
  - Silurian-Devonian: Wintermute, T.J., 1
- *Paleontology*
  - Anthozoa, Devonian: Swartz, C.K., 1
  - Aves, Pleistocene: Wetmore, A., 1
  - Brachiopoda
    - Devonian: Clarke, J.M., 3; Hall, J., 7; Schuchert, C., 4
    - Silurian: Swartz, C.K., 5
  - Bryozoa, Devonian: Ulrich, E.O., 1
  - Carnivora, Pleistocene: Bender, M.S., 1
  - Cystoidea, Silurian: Schuchert, C., 3
  - Gastropoda
    - Devonian: Ohern, D.W., 1
    - Ordovician: Rafinesque, C.S., 5
    - Silurian: Swartz, C.K., 5
  - Hydrozoa, Devonian: Swartz, C.K., 1
  - Nautiloidea, Silurian: Swartz, C.K., 5
  - Pelecypoda, Devonian: Clarke, J.M., 3; Ohern, D.W., 1
  - Trilobita
    - Cambrian: Walcott, C.D., 7
    - Silurian: Swartz, C.K., 5
- *Petrology*
  - Brailler Shale, plants: Platt, R.B., 1
- *Physical geology*
  - faults: Ewing, D.J., 1

BENTONITE
- Cameron Co., Devonian: Weaver, C.E., 6
- Central Pennsylvania, Ordovician: Weaver, C.E., 1, 2, 5
- Clinton Co., Devonian: Weaver, C.E., 6
- Erie Co., Devonian: Weaver, C.E., 6
- Mifflin Co., Ordovician: Whitcomb, L., 3
- Southwestern Pennsylvania, Devonian: Flowers, R.R., 1
- Western Pennsylvania, Devonian: Fettke, C.R., 41

BERAUNITE, *see also* Mineralogy
- Northampton Co.: Zodac, P., 1

BERKS COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
- *Areal geology*
  - Allentown Quad.: Trimko, D.J., 1
  - Boyerstown Quad.: Schramm, M.W., 1; Trimko, D.J., 1; Trump, G.W., 1
  - Reading Prong: Boyd, J.A., 1
- *Economic geology*
  - iron: Hawkes, H.E., Jr., 1, 2
  - limestone: Gray, C., 2, 3
  - mica: Buckwalter, T.V., Jr., 2
- *Geophysical investigations*
  - aeromagnetic
    - East Greenville Quad.: Socolow, A.A., 4
    - Morgantown Quad.: Socolow, A.A., 9
    - Sassamansville Quad.: Socolow, A.A., 16
  - magnetic survey: Hawkes, H.E., Jr., 1

Historical geology
- Cambrian: Wilkens, H., 1
- Cambrian-Ordovician, Reading Quad.: Hobson, J.P., Jr., 2
- Ordovician: Hobson, J.P., Jr., 1
- Ordovician-Silurian: Moseley, J.R., 2
- Precambrian-Cambrian
  - Boyertown Quad.: Buckwalter, T.V., Jr., 6
  - Reading Prong: Boyd, J.A., 1
- Precambrian-Ordovician: Gault, H.R., 3
- Triassic: McLaughlin, D.B., 4, 5

Maps
- aeromagnetic
  - East Greenville Quad.: Bromery, R.W., 4
  - Elverson Quad.: Bromery, R.W., 5
  - Morgantown Quad.: Bromery, R.W., 10
  - Sassamansville Quad.: Bromery, R.W., 17
- economic, limestone: Gray, C., 2, 3
- geologic, Boyertown Quad.: Buckwalter, T.V., Jr., 6
- geophysical, magnetic: Hawkes, H.E., Jr., 2

Petrology
- carbonate rocks: Gault, H.R., 2
- Conococheague Dolomite: Werner, J.E., 1
  - insoluble residue: Latshaw, W.L., 1
- diabase, Ordovician: Buckwalter, T.V., Jr., 4
- hornblende gneiss, granitized: Buckwalter, T.V., Jr., 5
- Pochuck Gneiss: Buckwalter, T.V., Jr., 1

Physical geology
- earthquakes: Murphy, L.M., 2, 3
- fault, Schuylkill Gap: Burtner, R., 1
- soil and contacts: O'Brien, G.D., 2
- structure, Evansville area: Gray, C., 1

Physiographic geology
- caves
  - Crystal Cave: Montgomery, M.L., 1
  - Ohnmacht Cave: Fisher, P.D., 1
- erosion surfaces: Wilkens, H., 2
- terraces: Wilkens, H., 3

BIBLIOGRAPHY
- Ashley, G.H.: Stone, R.W., 2
- Atwood, W.W.: Cressey, G.B., 1; Mather, K.F., 2
- Bastin, E.S.: Anderson, A.L., 3
- Birkinbine, J.: Raymond, R.W., 1
- Blake, W.P.: Babcock, K.C., 1
- Bownocker, J.A.: Stauffer, C.R., 1
- Brush, G.J.: Dana, E.S., 1
- Bryan, K.: Larsen, E.S., Jr., 1
- Buwalda, J.P.: Campbell, I., 2
- Case, E.C.: Kellum, L.B., 1
- Cathcart, S.H.: Willard, B., 9, 11
- caves, Pennsylvania: Mohr, C.E., 1
- Chadwick, G.H.: Goldring, W., 2
- Chamberlin, R.C.: Bowen, N.L., 1
- Chamberlin, T.C.: Anonymous 14; Chamberlin, R.T., 2; Willis, B., 6
- Clark, W.B.: Clarke, J.M., 4, 5
- Clarke, F.W.: Dennis, L.M., 1
- Dall, W. H.: Woodring, W.P., 1
- Daly, R.A.: Billings, M.P., 3
- Dana, E.S.: Knopf, A., 1
- Darton, N.H.: King, P.B., 3
- Davis, W.M.: Daly, R.A., 1
- Dawson, J.W.: Adams, F.D., 1; Ami, H.M., 2, 3
- Day, D.T.: Darton, N.H., 5
- Decker, C.E.: Branson, C.C., 1
- DeWolf, F.W.: Pratt, W.E., 2; Scott, H.W., 1
- Eaton, A.: McAllister, E.M., 1
- Eaton, H.N.: Smith, B., 1
- Eckel, E.C.: Spencer, A.C., 1
- Fellows, R.E.: Cloos, E., 4
- Foote, A.E.: Kunz, G.F., 2
- Gilbert, G.K.: Davis, W.M., 3; Mendenhall, W.C., 1
- Gordon, S.G.: Parrish, W., 1
- Grabau, A.W.: Sun, Y.C., 1
- Hall, G.M.: Amick, H.C., 1, 2
- Hay, O.P.: Lull, R.S., 1
- Hayden, F.V.: White, C.A., 1
- Hayes, C.W.: Brooks, A.H., 1
- Hitchcock, C.H.: Upham, W., 3
- Hobbs, W.H.: Gould, L.M., 1; Hobbs, W.H., 1
- Hovey, E.O.: Kemp, J.F., 2
- Hunt, T.S.: Pumpelly, R., 2
- James, J.F.: Gilbert, G.K., 2
- Keith, A.: Longwell, C.R., 2
- Kummel, H.B.: Johnson, M.E., 3
- Leith, C.K.: Hewett, D.F., 1
- Lewis, H.C.: Upham, W., 1
- Lobeck, A.K.: Miller, R.L., 1; Smith, G.H., 1
- McGee, WJ: Knowlton, F.H., 1
- Marsh, O.C.: Marsh, O.C., 1
- Merrill, G.P.: Lindgren, W., 1; Schuchert, C., 9
- Mitchill, S.L.: Hall, C.R., 1
- Osborn, H.F.: Gregory, W.K., 1; Ripley, H.E., 1, 2
- Owen, D.D.: Hendrickson, W.B., 2
- Packard, A.S.: Cockerell, T.D.A., 2
- Peck, F.B.: Shimer, H.W., 1
- Penfield, S.L.: Iddings, J.P., 2
- Pennsylvania geology: Cramer, H.R., 5
- Phalen, W.C.: Burchard, E.F., 1
- Raymond, P.E.: Stetson, H.C., 1
- Reeside, J.B., Jr.: Imlay, R.W., 1
- Reger, D.B.: Singewald, J.T., Jr., 3
- Richardson, G.B.: Richards, R.W., 1
- Rich, J.L.: Bucher, W.H., 1
- Ries, H.: Anonymous, 19; Anderson, A.L., 2; Moore, E.S., 2

Ruedemann, R.: Goldring, W., 3
Russell, I.C.: Willis, B., 3
Salisbury, R.D.: Chamberlin, R.T., 1
Schuchert, C.: Knopf, A., 2
Scudder, S.H.: Mayor, A.G., 1
Shaw, E.W.: Westgate, L.G., 1
Sherrill, R.E.: Dickey, P.A., 1; Fettke, C.R., 45
Silliman, B., Jr.: Wright, A.W., 1
Smith, J.L.: Silliman, B., Jr., 2
Spencer, J.W.W.: Shaw, E.W., 2
Stow, M.H.: Thom, W.T., Jr., 3
Swartz, C.K.: Singewald, J.T., Jr., 2
Ulrich, E.O.: Ruedemann, R., 4
Upham, W.: Emmons, W.H., 2
Van Hise, C.R.: Chamberlin, T.C., 6
Van Ingen, G.: Howell, B.F., Sr., 1
Ver Steeg, K.: Strahler, A.N., 2
Vodges, A.W.: Dumble, E.T., 1
Ward, L.F.: Cape, E.P., 1
Waterschoot van der Gracht, W.A.J.M. van: Umbgrove, J.H.F., 1
Weller, S.: Chamberlin, T.C., 7
Williams, E.H., Jr.: Miller, B.L., 1
Williams, G.H.: Johns Hopkins University, 1
Winchell, A.N.: Emmons, R.C., 1
Winslow, A.: Lane, A.C., 3

BIOGRAPHY
Angell, C.D.: Lytle, W.S., 8
Ashley, G.H.: Cathcart, S.H., 6; Stone, R.W., 2
Atwood, W.W.: Cressey, G.B., 1; Mather, K.F., 2
Baird, S.F.: Herber, E.C., 1
Bastin, E.S.: Anderson, A.L., 3
Bayley, W.S.: Ross, C.S., 1, 2
Berkey, C.P.: Savage, J.L., 1
Birkinbine, J.: Raymond, R.W., 1
Blake, W.P.: Keyes, C.R., 17
Bownocker, J.A.: Stauffer, C.R., 1
Branner, J.C.: Keyes, C.R., 5; Lane, A.C., 2; Smith, J.P., 1
Brush, G.J.: Dana, E.S., 1
Bryan, K.: Johnson, F., 1; Larsen, E.S., Jr., 1; Roy, L.L., 1; Whittlesey, D., 1
Bryant, W.L.: Gregory, W.K., 2
Buwalda, J.P.: Campbell, I., 1, 2
Carll, J.F.: Lytle, W.S., 6
Case, E.C.: Kellum, L.B., 1; Wilson, J.A., 1
Cathcart, S.H.: Stone, R.W., 7; Willard, B., 9, 11
Chadwick, G.H.: Goldring, W., 2
Chamberlin, R.T.: Bowen, N.L., 1; Thorington, J.M., 1
Chamberlin, T.C.: Alden, W.C., 1; Chamberlin, R.T., 2; Fairchild, H.L., 7; Keyes, C.R., 8; Longwell, C.R., 1; Mather, K.F., 1; Schuchert, C., 8; Willis, B., 4, 5, 6
Clark, W.B.: Clarke, J.M., 4, 5; Emerson, B.K., 1; Mathews, E.B., 2
Clarke, F.W.: Dennis, L.M., 1
Clarke, J.M.: Anonymous, 11, 13; Keyes, C.R., 11; Raymond, P.E., 1
Cook, I.C.: Lane, A.C., 1
Cope, E.D.: Keyes, C.R., 13
Corss, F.: Hayden, H.E., 1
Dall, W.H.: Parker, G.H., 1; Pilsbry, H.A., 1; Woodring, W.P., 1
Daly, R.A.: Billings, M.P., 1, 2, 3
Dana, E.S.: Anonymous, 18; Berkey, C.P., 3; Ford, W.E., 1, 2; Knopf, A., 1; Palache, C., 1; Schuchert, C., 10
Dana, J.D.: Farrington, O.C., 1; Tarr, Mrs. W.A., 1
Darton, N.H.: Anonymous, 26; Brown, R.W., 1; King, P.B., 3; Miser, H.D., 1; Visher, S.S., 1
Davis, W.M.: Auer, V., 1; Bauling, H., 1; Block, C.F., 1; Bondarenko, B., 1; Bowman, I., 2; Buwalda, J.P., 1, 2; Daly, R.A., 1; Davies, A.M., 1; Dodge, R.E., 1; Edelstein, Y.S., 1; Johnson, D.W., 2; Keyes, C.R., 15; Martin, L., 1; Martonne, E., 1; Mill, H.R., 1; Nussbaum, F., 1; Sestini, A., 1
Dawson, J.W.: Adams, F.D., 1, 2; Ami, H.M., 2
Day, D.T.: Campbell, M.R., 8; Darton, N.H., 5
Decker, C.E.: Branson, C.C., 1; Monnett, V.E., 1
DeWolf, F.W.: Pratt, W.E., 2; Scott, H.W., 1
Diller, J.S.: Smith, G.O., 1
Eaton, A.: Good, H.G., 1; McAllister, E.M., 1
Eaton, H.N.: Smith, B., 1
Eckel, E.C.: Spencer, A.C., 1
Evans, L.: White, G.W., 1
Fellows, R.E.: Cloos, E., 4
Fettke, C.R.: Simmons, A.C., 1
Fieldner, A.C.: Anonymous, 22
Foerste, A.F.: Anonymous, 17; Cumings, E.R., 1; Wright, F.J., 1
Foote, A.E.: Dake, H.C., 1; Kunz, G.F., 2
Gesner, A.: Gesner, G.W., 1
Gilbert, G.K.: Andrews, E.C., 1; Barrell, J., 1; Davis, W.M., 2, 3; Fairchild, H.L., 5; Mendenhall, W.C., 1; Merriam, C.H., 1; Penck, A., 1
Girty, G.H.: Anonymous, 21
Gordon, S.G.: Parrish, W., 1; Trudell, H.W., 1
Grabau, A.W.: Shimer, H.W., 5; Sun, Y.C., 1
Gratacap, L.P.: Kunz, G. F., 3; Stanton, G.S., 1

Hall, G.M.: Amick, H.C., 1, 2; Singewald, J.T., Jr., 1
Hall, J.: Barrois, C., 1; McGee, WJ, 2
Hay, O.P.: Lull, R.S., 1
Hayden, F.V.: White, C.A., 1
Hayes, C.W.: Brooks, A.H., 1
Hitchcock, C.H.: Upham, W., 3
Hobbs, W.H.: Bartlett, H., 1; Blythe, J.D.M., 1; Georgi, J., 1; Gould, L.M., 1; Hall, R.B., 1; Hobbs, W.H., 1; Hubbard, G.D., 1
Hovey, E.O.: Anonymous, 12; Berkey, C.P., 2; Kemp, J.F., 1, 2; Keyes, C.R., 10; Whitlock, H.P., 1
Howell, E.E.: Fairchild, H.L., 4
Hunt, T.S.: Pumpelly, R., 2
James, J.F.: Gilbert, G.K., 2
Johnson, D.W.: Martonne, E., 2; Sandford, K.S., 1
Keith, A.: Longwell, C.R., 2
Kemp, J.F.: Emerson, B.K., 2; Peele, R., 1
Keyes, C.R.: Keyes, C.R., 19
Kummel, H.B.: Johnson, M.E., 2, 3
Lacoe, R.D.: White, C.D., 2
Leighton, M.M.: Dott, R.H., 1
Leith, C.K.: Davidson, C.F., 1; Hewett, D.F., 1; Rubey, W.W., 1
Leonard, A.G.: Hult, G., 1
Lesley, J.P.: Cate, A.S., 1; Whitcomb, L., 1
Leverett, F.: Bergquist, S.G., 1
Lewis, H.C.: Upham, W., 1, 2
Lobeck, A.K.: Miller, R. L., 1; Sharp, H.S., 1; Smith, G.H., 1
Lyell, C.: Eiseley, L.C., 1
McGee, WJ: Darton, N.H., 4; Keyes, C.R., 3; Knowlton, F.H., 1; McGee, E.R., 1
Macfarlane, J.: White, C.D., 1
Maclure, W.: Keyes, C.R., 12
Marcou, J.: Keyes, C.R., 7
Marsh, O.C.: Ami, H.M., 1
Meek, F.B.: Keyes, C.R., 18
Merrill, G.P.: Benjamin, M., 1; Farrington, O.C., 4; Lindgren, W., 1; Schuchert, C., 9
Mitchill, S.L.: Hall, C.R., 1
Moodie, R.L.: Bryan, W.A., 1
Moseley, J.R.: Anonymous, 47
Newberry, J.S.: Britton, N.L., 2
Osborn, H.F.: Gregory, W.K., 1; Keyes, C.R., 16; Richter, R., 1, 2; Shimer, H.W., 3; Woodward, A.S., 1
Owen, D.D.: Anonymous, 7; Hendrickson, W.B., 1, 2
Packard, A.S.: Cockerell, T.D.A., 2
Peck, F.B.: Shimer, H.W., 1
Penfield, S.L.: Iddings, J.P., 2
Phalen, W.C.: Burchard, E.F., 1
Philadelphia geologists: Wenrich, D.H., 1
Pirsson, L.V.: Iddings, J.P., 3
Pilsbry, H.A.: Anonymous, 46; Baker, H.B., 1, 2
Raymond, P.E.: Stetson, H.C., 1
Reeside, J.B., Jr.: Cobban, W.A., 1; Henbest, L.G., 1; Imlay, R.W., 1
Reger, D.B.: Singewald, J.T., Jr., 3
Rich, J.L.: Barbour, G.B., 1; Bucher, W.H., 1; Jenks, W.F., 1
Richards, H.G.: Clark, F.R., 1
Richardson, G.B.: Richards, R.W., 1; Wood, R.H., 1
Ries, H.: Anderson, A.L., 1, 2; Anonymous, 19, 27; Moore, E.S., 2; Teas, L.P., 1
Rogers, W.B.: Bevan, A.C., 1, 2
Ruedemann, R.: Goldring, W., 3
Russell, I.C.: Davis, C.A., 1; Gilbert, G.K., 3; Leverett, F., 1; Lombard, W.R., 1; Willis, B., 3
Salisbury, R.D.: Keyes, C.R., 6; Chamberlin, R.T., 1; Chamberlin, T.C., 5; Wrather, W.E., 1
Schoepf, J.D.: Williams, G.H., 1
Schuchert, C.: Arber, M.A., 1; Clark, T.H., 1; Cooper, G.A., 2; Dunbar, C.O., 1; Knopf, A., 2; Leuchs, K., 1; Lull, R.S., 2; Sellards, E.H., 1; Troedsson, G.T., 1; Twenhofel, W.H., 1
Scudder, S.H.: Anonymous, 9: Cockerell, T.D.A., 1; Kingsley, J.S., 1; Mayor, A.G., 1
Shaw, E.W.: Trowbridge, A.C., 1; Westgate, L.G., 1
Sherrill, R.E.: Dickey, P.A., 1; Fettke, C.R., 45
Silliman, B., Jr.: Wright, A.W., 1
Silliman, B., Sr.: Anonymous, 6; Caswell, A., 1; Fisher, G.P., 1; Fulton, J.F., 1
Sinclair, W.J.: Anonymous, 16
Smith, G.O.: Anonymous, 24
Smith, J.L.: Silliman, B., Jr., 2
Spencer, J.W.W.: Shaw, E.W., 2
Stow, M.H.: Cooper, B.N., 2; Thom, W.T., Jr., 2, 3
Swartz, C.K.: Singewald, J.T., Jr., 2
Theissen, R.: Anonymous, 40
Ulrich, E.O.: Bassler, R.S., 3; Jones, O.T., 1; Raymond, P.E., 2; Ruedemann, R., 4
Upham, W.: Emmons, W.H., 2; Keyes, C.R., 14
Van Hise, C.R.: Berkey, C.P., 1; Chamberlin, T.C., 4, 6; Wolff, J.E., 1
Van Ingen, G.: Howell, B.F., Sr., 1
Ver Steeg, K.: Strahler, A.N., 2
Vodges, A.W.: Dumble, E.T., 1; Keyes, C.R., 9; Resser, C.E., 1
Walcott, C.D.: Anonymous, 10
Ward, H.A.: Fairchild, H.L., 6

Ward, L.F.: Cape, E.P., 1; Hollick, C.A., 1
Waterschoot van der Gracht, W.A.J.M., van: Anonymous, 23; Gulley, M.G., 1; Strachan, C.B., 1; Umbgrove, J.H.F., 1
Weller, S.: Chamberlin, T.C., 7; Jillson, W.R., 2
White, C.A.: Benjamin, M., 1; Keyes, C.R., 4
White, C.D.: Anonymous, 15; Berry, E.W., 2; Stanton, T.W., 1
White, I.C.: Price, P.H., 1
Williams, E.H., Jr.: Miller, B.L., 1
Williams, G.H.: Clarke, J.M., 1; Iddings, J.P., 1; Johns Hopkins University, 1
Williams, H.S.: Weller, S., 2
Willis, B.: Maucher, A., 1; Visher, S.S., 2; Williams, H., 1
Winchell, A.N.: Emmons, R.C., 1; Winchell, N.H., 1
Winslow, A.: Lane, A.C., 3

BITUMENS
anthraxolite, Pennsylvania: Dietrich, R.V., 1
Devonian, Huntington-Mifflin Cos.: Swain, F.M., Jr., 3
grahamite, Washington Co.: Koppe, E.F., 2

BLAIR COUNTY, *see also* Pennsylvania and Pennsylvania-Central
Areal geology
Spruce Creek area: Franks, P.C., 1
Economic geology
manganese: Hoffman, J.N., 1
Engineering geology
Hollidaysburg Quad.: U. S. Geol. Survey, Engineering Geology and Groundwater Branches, 1
Historical geology
Cambrian-Pennsylvanian: Swartz, F.M., 8
Silurian-Devonian: Wimer, P., 1
Mineralogy
celestite: Hamilton, H.V., 1
Paleontology
Anthozoa, Ordovician: Bassler, R.S., 4
Brachiopoda, Ordovician: Ulrich, E.O., 4
Bryozoa, Silurian: Swartz, C.K., 5
Crinoidea, Devonian: Goldring, W., 1
fucoid, Silurian: Becker, H.F., 1
Mammalia, Pleistocene: Hall, E.R., 1
Ostracoda, Silurian: Swartz, C.K., 5
Pisces, Mississippian: Hay, O.P., 1
Reptile, snake, Pleistocene: Gilmore, C.W., 1
Trilobita, Cambrian: Resser, C.E., 4, 8; Walcott, C.D., 6
Physical geology
Birmingham Thrust Fault: Fox, H.D., 1
thrust fault, Sinking Valley area: Moebs, N.W., 1
Physiographic geology
caves: Parker, J.D., 2
Barker Farm Cave: Kutz, D., 1
Tylistoco Cave: Deike, G., 3d, 1
Tytoona Cave: Anonymous, 38

BLASTOIDEA
Dauphin Co., Devonian: Cramer, H.R., 3

BLUE RIDGE
Structure: Cloos, E., 5

BOLTWOODITE, *see also* Mineralogy
Northampton Co.: Montgomery, A., 6

BORNITE, *see also* Mineralogy
Chester Co.: Genth, F.A., 1

BOULDER FIELDS
Carbon Co., Hickory Run: Smith, H.T.U., 1

BRACHIOPODA, *see also* Invertebrata
Bedford Co.
Devonian: Hall, J., 7; Clarke, J.M., 3; Schuchert, C., 4
Silurian: Swartz, C.K., 5
Blair Co., Ordovician: Ulrich, E.O., 4
Bradford Co., Devonian: Hall, J., 21
Bucks Co., Cambrian: Howell, B.F., Sr., 5
Central Pennsylvania
Cambrian: Tasch, P., 4
Devonian: Percival, S.F., 1
Centre Co., Ordovician: Ulrich, E.O., 5
Crawford Co., Devonian: Hall, J., 7, 21; Schuchert, C., 1
Erie Co., Devonian: Schuchert, C., 1
Franklin Co., Ordovician: Neuman, R.B., 1; Sando, W.J., 1; Ulrich, E.O., 5
Fulton Co., Devonian: Clarke, J.M., 3
Huntingdon Co., Ordovician: Ulrich, E.O., 5
Lehigh Co., Ordovician: Ulrich, E.O., 5
Luzerne Co., Pennsylvanian: Chow, M.M., 1
McKean Co., Mississippian: Hall, J., 21, 22
Mifflin Co., Silurian: Cloud, P.E., Jr., 1
Northern Pennsylvania, Devonian: Hall, J., 21, 22
Northampton Co., Cambrian: Howell, B.F., Sr., 3
Northumberland Co., Silurian: Cloud, P.E., Jr., 1

Northwestern Pennsylvania
Devonian: Cooper, G.A., 3; Greiner, H., 1; Holland, F.D., Jr., 1
Mississippian: Hall, J., 21; Holland, F.D., Jr., 1
Pennsylvania, Ordovician: Cooper, G.A., 5
Perry Co.
Devonian: Hall, J., 21
Silurian: Cloud, P.E., Jr., 1
Schuylkill Co., Devonian: Cloud, P.E., Jr., 1
Tioga Co., Devonian: Hall, J., 6, 7, 21
Venango Co., Mississippian: Winchell, A., 1
Warren Co.
Devonian: Hall, J., 21; Schuchert, C., 1
Mississippian: Hall, J., 21
York Co., Cambrian: Walcott, C.D., 1, 2, 3, 5

BRADFORD COUNTY, *see also* Pennsylvania and Pennsylvania-Northern
Areal geology
Bradford Co., popular: Myers, R.E., 3
Economic geology
coal, bituminous: Lesley, J.P., 1
iron ore: Lesley, J.P., 1
Geophysical investigations
gravity: Duecher, J.C., 1
Historical geology
Devonian: Fettke, C.R., 12; Kreidler, W.L., 1
Maps
economic
Barclay coal bed: Lesley, J.P., 1
oil and gas: Kreidler, W.L., 1
Paleontology
Ammonoidea, Devonian: Hall, J., 10
Brachiopoda, Devonian: Hall, J., 21
Nautiloidea, Devonian: Hall, J., 18, 19
Pelecypoda: Hall, J., 13
Pisces, Devonian: Eastman, C.R., 2

BRANCHIOPODA, *see also* Crustacea and Invertebrata
Bucks Co.
Cambrian: Howell, B.F., Sr., 5
Triassic: Jones, T.R., 3; Raymond, P.E., 3
Cambria Co., Pennsylvanian: Raymond, P.E., 3
Chester Co., Triassic: Jones, T.R., 1, 4; Raymond, P.E., 3
Luzerne Co., Pennsylvanian: Packard, A.S., Jr., 1
Schuylkill Co., Mississippian: Jones, T.R., 1, 2; Raymond, P.E., 3
Southeastern Pennsylvania, Triassic: Bock, W., 4
York Co., Triassic: Raymond, P.E., 3

BRONZITE, *see also* Mineralogy
Lancaster Co.: Garrett, T.H., 1

BRUCITE, *see also* Mineralogy
Chester Co., popular: Thomas, C.A., 1
Delaware Co., popular: Thomas, C.A., 1
Lancaster Co.: Brindley, G.W., 1; Brush, G.J., 1; Dana, J.D., 1

BRYOZOA, *see also* Invertebrata
Bedford Co., Devonian: Ulrich, E.O., 1
Blair Co., Silurian: Swartz, C.K., 5
Lebanon Co., Devonian: McNair, A.H., 1
Pennsylvania, Silurian: Bassler, R.S., 1
Perry Co., Devonian: McNair, A.H., 1

BUCHOLZITE, *see also* Mineralogy
Chester Co.: Silliman, B., Jr., 1

BUCKS COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
Areal geology
Bucks Co.: Willard, B., 19
Buckingham Valley area: Lessentine, R.N., 1
Durham Township: Beeler, D.O., 1
Monroe area: Lutsey, I.A., Jr., 1
Economic geology
gravel: Ward, F., 1
lead: Dickeson, M.W., 2; Earl, K.M., 2
mineral resources: Gault, H.R., 5
radioactive minerals: Klemic, H., 3; McKeown, F.A., 1
sand: Ward, F., 1
uranium: McCauley, J.F., 1; McKeown, F.A., 2
Geophysical investigations
aeromagnetic
Buckingham Quad.: Socolow, A.A., 2
Elverson Quad.: Socolow, A.A., 5
Lambertville Quad.: Socolow, A.A., 2
Milford Square Quad.: Socolow, A.A., 8
Perkiomenville Quad.: Socolow, A.A., 11
Quakertown Quad.: Socolow, A.A., 13
Stockton Quad.: Socolow, A.A., 2
radioactivity survey: Stewart, R.H., 1
Ground water
Bucks Co.: Barksdale, H.C., 1; Greenman, D.W., 1
artesian wells: Woolman, L., 1
springs: Normandie, J., 1; Rush, B., 1
Triassic area: Bock, W., 8
Historical geology
Cambrian, Limeport Formation: Anonymous, 43
Cambrian-Ordovician: Willard, B., 20
Precambrian: Freedman, J.L., 1

Precambrian-Cambrian: Anonymous, 42
Precambrian-Recent: Willard, B., 19
radioactive dating: Jaffee, H.W., 1
Triassic: Bock, W., 7; Johnson, M.E., 5; Lafayette College, 3; McLaughlin, D.B., 6
Maps
aeromagnetic
Allentown Quad.: Bromery, R.W., 1
Buckingham Quad.: Bromery, R.W., 2
Lambertville Quad.: Bromery, R.W., 6
Malvern Quad.: Bromery, R.W., 7
Milford Square Quad.: Bromery, R.W., 9
Perkiomenville Quad.: Bromery, R.W., 12
Quakertown Quad.: Bromery, R.W., 14
Stockton Quad.: Bromery, R.W., 6
geologic: Barksdale, H.C., 1; Greenman, D.W., 1; Willard, B., 3
Buckingham Mountain: Wherry, E.T., 3
Mineralogy
minerals: Carpenter, G.W., 2
Paleontology
Amphibia, Triassic: Colbert, E.H., 1
Brachiopoda, Cambrian: Howell, B.F., Sr., 5
Branchiopoda
Cambrian: Howell, B.F., Sr., 5
Triassic: Bock, W., 4; Jones, T.R., 3; Raymond, P.E., 3
Mammalia, Pleistocene: Mercer, H.C., 1
buffalo, Pleistocene: Rhoads, S.N., 1
Pisces, Triassic: Bock, W., 6, 7
plant, Triassic: Bock, W., 1; Britton, N.L., 1
Triassic biota: McLaughlin, D.B., 6
Trilobita, Cambrian: Howell, B.F., Sr., 5
Petrology
carbonate rocks: Gault, H.R., 2
hornfels, Triassic: Montgomery, A., 5
metamorphic rocks: Freedman, J.L., 1
pinite schist: Virgin, W.W., Jr., 2
Physical geology
Edison Fault, Triassic: Bock, W., 7
Physiographic geology
glacial features: Peltier, L.C., 3

BUTLER COUNTY, *see also* Pennsylvania, Pennsylvania-Southwestern, and Pennsylvania-Western
Economic geology
coal, bituminous, Freeport-New Kensington Quads.: Koppe, E.F., 3
limestone: Lytle, W.S., 10
Historical geology
Cambrian-Pleistocene: Fettke, C.R., 15
Devonian, Butler Quad.: Lytle, W.S., 3
Devonian-Pennsylvanian: Lytle, W.S., 10
Pennsylvanian
Foxburg Quad.: Angermann, T.W., 1
Freeport Quad.: Koppe, E.F., 1
Maps
economic
limestone: Ames, J.A., 2
oil and gas, Butler Quad.: Lytle, W.S., 3
structure contour, Vanport Limestone, Butler Quad.: Lytle, W.S., 3
Petrology
Freeport Coal parting: Koppe, E.F., 1
Physiographic geology
Hineman Cave: Risler, G., 1

CACOXENITE, *see also* Mineralogy
Northampton Co.: Gordon, S.G., 1; Zodac, P., 1

CALCITE, *see also* Mineralogy
Pennsylvania: White, W.B., 3

CAMBRIA COUNTY, *see also* Pennsylvania and Pennsylvania-Western
Areal geology
New Bloomfield Quad.: Cleaves, A.B., 1
New Florence Quad.: Shaffner, M.N., 1, 5
Economic geology
coal, bituminous
New Florence Quad.: Shaffner, M.N., 1, 3, 4, 5
reserves: Dowd, J.J., 1
clay, New Florence Quad.: Shaffner, M.N., 1, 5
iron, New Florence Quad.: Shaffner, M.N., 1, 5
limestone, New Florence Quad.: Shaffner, M.N., 1, 5
natural gas, New Florence Quad.: Shaffner, M.N., 1, 5
sand and gravel, New Florence Quad.: Shaffner, M.N., 5
sandstone, New Florence Quad.: Shaffner, M.N., 1, 5
Ground water
New Florence Quad.: Shaffner, M.N., 5
Historical geology
Devonian-Pennsylvanian, New Florence Quad.: Shaffner, M.N., 1
Mississippian-Pleistocene, New Florence Quad.: Shaffner, M.N., 5
Maps
economic
coal, bituminous: Dowd, J.J., 1
New Florence Quad.
Brookville Coal: Shaffner, M.N., 5
mineral resources: Shaffner, M.N., 1, 5

- Lower Freeport Coal: Shaffner, M.N. 5
- Lower Kittanning Coal: Shaffner, M.N., 5
- Upper Freeport Coal: Shaffner, M.N., 5
- Upper Kittanning Coal: Shaffner, M.N., 5
- Rider Coal: Shaffner, M.N., 5
- geologic, New Florence Quad.: Shaffner, M.N. 1, 5
- structure contour, New Florence Quad., Lower Kittanning coal: Shaffner, M.N., 1
- *Paleontology*
  - Branchiopoda, Pennsylvanian: Raymond, P.E., 3

CAMBRIAN PERIOD, *see also* Paleozoic Era
- Adams Co., Carlisle Quad.: Stose, G.W., 4
- Berks Co.: Boyd, J.A., 1; Wilkens, H., 1
  - Boyertown Quad.: Buckwalter, T.V., Jr., 6
  - Reading Quad.: Hobson, J.P., Jr., 2
- Blair Co.: Swartz, F.M., 8
- Bucks Co.: Anonymous, 42; Willard, B., 19, 20
  - Limeport Formation: Anonymous, 43
- Butler Co.: Fettke, C.R., 15
- Central Pennsylvania: Willard, B., 17; Wilson, J.L., 2
  - Conococheague Limestone: Long, M.B., 1
- Centre Co.: Tasch, P., 2; Swartz, F.M., 6
- Chester Co.: Watson, E.H., 2
- Cumberland Co., Carlisle Quad.: Stose, G.W., 4
- Erie Co.: Fettke, C.R., 14; Wagner, W.R., 3
- Franklin Co.: Palacas, J.G., 1
- Lebanon Co.: Gray, C., 5, 7, 8
  - Lebanon Quad.: Geyer, A.R., 3
  - Richland Quad.: Gray, C., 12
- Mercer Co.: Wagner, W.R., 2
- Northampton Co.: Willard, B., 12
- Northern Pennsylvania: Fettke, C.R., 34
- Northwestern Pennsylvania: Cathcart, S.H., 2; Linn, E.H., 3
- Pennsylvania: Resser, C.E., 3; Swartz, F.M., 3
- Philadelphia Co.: Watson, E.H., 2
  - Wissahickon Schist: Frondel, J.W., 1
- Southeastern Pennsylvania: Dyson, J.L., 2; Frazer, P., Jr., 3; Geyer, A.R., 2; Gray, C., 9; Howell, B.F., Sr., 2, 4; Hunt, T.S., 2, 3; Johnson, M.E., 4; Kobayashi, T., 1; Mathews, E.B., 1; Prouty, C.E., 1; Willard, B., 13
  - Delaware River Valley: Richards, H.G., 2
- Western Pennsylvania: Fettke, C.R., 55; Robinson, J.F., 1; Rogers, D., Jr., 1
- York Co., Carlisle Quad.: Stose, G.W., 4

CAMERON COUNTY, *see also* Pennsylvania and Pennsylvania-Western
- *Economic geology*
  - coal, bituminous: Dickeson, M.W,. 4; Shriber, R.C., 1; Warren, G., 1
  - iron: Warren, G., 1
  - natural gas
    - Driftwood Quad.: Bolger, R.C., 5
    - Driftwood-Benzette Field: Bolger, R.C., 4
  - petroleum: Dickeson, M.W., 4
  - sandstone: Dickeson, M.W., 4
- *Historical geology*
  - Devonian-Mississippian: Bolger, R.C., 6; Fettke, C.R., 43
  - Devonian-Pennsylvanian, Driftwood Quad.: Bolger, R.C., 5
- *Maps*
  - geologic, Leidy Gas Field: Ebright, J.R., 2
  - structure
    - Driftwood Quad.: Bolger, R.C., 5
    - southern: Pennsylvania Geological Survey, 1
  - structure contour
    - Driftwood-Benzette Gas Field: Fettke, C.R., 55
    - Driftwood Gas Field
      - Oriskany Sandstone: Bolger, R.C., 5
      - Tully Limestone: Bolger, R.C., 5
    - Pocono Sandstone: Ebright, J.R., 2
- *Petrology*
  - bentonite, Devonian: Weaver, C.E., 6
- *Physical geology*
  - structure, Driftwood Quad.: Bolger, R.C., 5
- *Physiographic geology*
  - stream profile: Broscoe, A.J., 2

CARBON COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern
- *Economic geology*
  - coal, anthracite: Anonymous, 4
  - radioactive minerals: Dyson, J.L., 3
  - uranium: Klemic, H., 1, 2; McCauley, J.F., 1; Walthier, T.N., 1
- *Geochemical investigations*
  - radioactive dating: Stern, T.W., 1

Geophysical investigations
  electrical resistivity, Lehigh Tunnel: Scharon, H.L., 2
Historical geology
  Devonian: Willard, B., 16
  Mississippian-Pennsylvanian: Gault, H.R., 4
Mineralogy
  radioactive minerals: Dyson, J.L., 3; Finch, W., 1; Montgomery, A., 3
Paleontology
  Pelecypoda, Pennsylvanian: Davies, J.H., 1
  plants
    Devonian: Goeppert, J.H.R., 2
    Mississippian: Arber, E.A.N., 1
    Pennsylvanian: Darrah, W.C., 4; Goeppert, J.H.R., 4
  Trilobita, Devonian: Green, J., 1
Physical geology
  folding: Dyson, J.L., 4
  folding and faulting: Engel, G.W., 1
  structure, Lehigh Gap area: Macfayden, J.A., Jr., 1
Physiographic geology
  Hickory Run Boulder Field: Smith, H.T.U., 1

CARBON RATIO THEORY
  Pennsylvania: Reeves, F., 2

CAVES
  Armstrong Co.: Dunn, J.R., 4; White, W.B., 2
  Berks Co.
    Crystal Cave: Montgomery, M.L., 1
    Ohnmacht Cave: Fisher, P.D., 1
  Blair Co.: Parker, J.D., 2
    Barker Farm Cave: Kutz, D., 1
    Tyiistoco Cave: Deike, G., 3d, 1
    Tytoona Cave: Anonymous, 38
  Butler Co., Hineman Cave: Risler, G., 1
  Central Pennsylvania: deVitt, W., 3d, 2; Haas, J., 3
  Centre Co.: Hartman, F., 1, 3; Landis, C., 2
    Boalsburg Cave: Landis, C., 1
    Chisel Cave: Anonymous, 44
    Deer Bone Cave: Stellmack, J., 1
    Elk Creek Cave: Stellmack. J., 2
    Hennigh Cave: Hassemer, G., 2
    Hosterman's Cave: Turner, T.D., 3
    Madisonburg Cave: Turner, T.D., 5
    Millers Caves: Francis, K., 1
    Millheim Cave. Smeltzer, B.L., 1
    Nolls Cave: Anonymous, 34
    Penn's Cave: Shoemacher, H.W., 1
    Rock Caves: Turner, T.D., 1
    Rockview Cave: Anonymous, 35
    Veiled Lady Cave: Anonymous, 31; Hartman, F., 2
  Clarion Co.: Dunn, J.R., 4; White, W.B., 3
    Worthless Cave: Reitz, E., 1
  Cumberland Co.: Smeltzer, B.L., 4
    Hershey Cave: Smeltzer, B.L., 3
    Peipers Cave: Anonymous, 48
  Fayette Co.: Dunn, J.R., 4
    Casparis Cave: Dunn, J.R., 2
    Franks Cave: Dunn, J.R., 5
    Jumonville Cave: Dunn, J.R., 3, 4
  Franklin Co.: Smeltzer, B.L., 4
    Needy Cave: Smeltzer, B.L., 5
    Woodchuck Cave: Smeltzer, B.L., 3
  Fulton Co., Garlands Cave: Klein, M.M., 1
  Huntingdon Co.
    Bear Den Cave: Turner, T.D., 2
    Graysville Cave: Hassemer, G., 3
    Hesston Cave: Barger, J., 1
    Kooken's Cave: Anonymous, 33, 45; deVitt, W., 3d, 1; Edwards, J., 2
    McConnellstown Quarry Cave: Edwards, J., 1, 3; White, W.B., 1
    Petersburg Cave: Ifft, J., 1
    Wellers Cave: Barger, J., 1
  Indiana Co., Strangford Cave: Risler, G., 1
  Lawrence Co.: White, W.B., 2
  Lebanon Co., Swatara Creek: Miller, P., 1
  Mifflin Co.: Landis, C., 3
    Aitken Cave: Anonymous, 28; Parker, J.D., 1
    Bottomless Pitch Pit Cave: Matthews, L., 1
    Brubaker Cave: Anonymous, 32
    Dave's Cave: Haas, J., 1
    Diamond I Cave: Hassemer, G., 1
    Goss Cave: Anonymous, 39
    Milroy Caves: Anonymous, 37
    Nails No. 1 Cave: Anonymous, 30
    Rupert Cave: Smeltzer, B.L., 2
    Seawra Cave: Anonymous, 36
  Montgomery Co.: Parker, J.D., 2
  Pennsylvania: Davies, W.E., 1; Davis, W.M., 4; Parker, J.D., 2; Stone, R.W., 3, 4, 6
    bibliography: Mohr, C.E., 1
  Potter Co., Ice Cave: Andrews, M.O., 1
  Snyder Co.: Landis, C., 3
    McClure Cave: Anonymous, 29
  Somerset Co., Shafer Run Cave: Gorman, J.M., 1
  Southeastern Pennsylvania: Smeltzer, B.L., 3
  Venango Co., Good Cave: Smith, G.G., Jr., 1
  Westmoreland Co.
    Bear Cave: Risler, G., 1
    Ken's Cave: Nelson, B., 1
    Lycippus Cave: Dunn, J.R., 1

CELESTITE, *see also* Mineralogy
- Blair Co.: Hamilton, H.V., 1

CEMENT, *see also* Mineral resources
- Bucks Co.: Gault, H.R., 5
- Lehigh Co.: Lafayette College, 1
- Northampton Co.: Lafayette College, 1
- Southeastern Pennsylvania: Miller, B.L., 2

CENZOIC ERA, *see also* Pleistocene Epoch
- Franklin Co.: Lesley, J.P., 7
- Pennsylvania: King, P.B., 5; Lebling, C., 2; Richards, H.G., 1

CENTRE COUNTY, *see also* Pennsylvania and Pennsylvania-Central
- *Areal geology*
  - Aaronsburg-Coburn-Millhein area: Long, M.A., 1
  - Allensville Quad.: Wilson, P.C., 1
- *Economic geology*
  - coal, bituminous, Snoe Shoe Basin: Roberts, W.F., 17
  - fire clay: Weitz, J.H., 2
  - manganese: Hoffman, J.N., 1
- *Historical geology*
  - Cambrian: Tasch, P., 2
  - Cambrian-Ordovician: Swartz, F.M., 6
  - Devonian-Pennsylvanian: Ebright, J.R., 4
  - Ordovician: Folk, R.L., 3
  - Pennsylvanian: Williams, E.G., 2
  - Pleistocene: Sears, P.B., 1
- *Maps*
  - economic, natural gas: Ebright, J.R., 4
  - structure, Hyner-Ferney area: Ebright, J.R., 4
- *Mineralogy*
  - clay: Weaver, C.E., 4
- *Paleontology*
  - algae, Cambrian: Tasch, P., 2
  - Anthozoa, Ordovician: Bassler, R.S., 4
  - Brachiopoda, Ordovician: Ulrich, E.O., 5
  - Nautiloidea, Ordovician: Foerste, A.F., 2; Ulrich, E.O., 6
  - Trenton Limestone, Ordovician: Schneider, A.F., 1
  - Trilobita
    - Cambrian: Resser, C.E., 5, 6, 8; Walcott, C.D., 6, 8, 9
    - Ordovician: Tasch, P., 3; Walcott, C.D., 8, 9; Whittington, H.B., 1
- *Petrology*
  - carbonate rocks, Ordovician: Folk, R.L., 3
  - oolite-bearing rocks: Choquette, P.W., 1
- *Physical geology*
  - cross bedding, Pennsylvanian: Nickelsen, R.P., 2
- *Physiographic geology*
  - caves: Hartman, F., 1, 3; Landis, C., 2
    - Boalsburg Cave: Landis, C., 1
    - Chisel Cave: Anonymous, 44
    - Deer Bone Cave: Stellmack, J., 1
    - Elk Creek Cave: Stellmack, J., 2
    - Hennigh Cave: Hassemar, G., 2
    - Hosterman's Cave: Turner, T.D., 3
    - Madisonburg Cave: Turner, T.D., 5
    - Millers Caves: Francis, K., 1
    - Millheim Cave: Smeltzer, B.L., 1
    - Nolls Cave: Anonymous, 34
    - Penn's Cave: Shoemacher, H.W., 1
    - Rock Caves: Turner, T.D., 1
    - Rockview Cave: Anonymous, 35
    - Veiled Lady Cave: Anonymous, 31; Hartman, F., 2

CEPHALOPODA, *see* individual types

CERUSSITE, *see also* Mineralogy
- Chester Co.: Genth, F.A., 1

CHALCOPYRITE, *see also* Mineralogy
- Chester Co.: Genth, F.A., 1

CHALCOTRICHITE, *see also* Mineralogy
- Chester Co.: Blake, W.P., 1

CHERT, *see also* Silica
- Central Pennsylvania, Ordovician: Folk, R.L., 2

CHESTER COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
- *Areal geology*
  - Valley Forge Park: Rader, H.L., 1
  - Warwick Mine area: Yeakel, L., 1
- *Economic geology*
  - chromium: Luft, S.J., 1; Pearre, N.C., 2
  - copper: Wherry, E.T., 1
  - graphite: Sanford, R.S., 1
  - kaolin: Spencer, G., 1
  - lead: Genth, F.A., 1
  - petroleum: Bibbins, A.B., 1
  - sulphide-minerals: Oldach, F.M., 1
  - zinc: Woodhouse, J., 1
- *Geophysical investigations*
  - aeromagnetic
    - Elverson Quad.: Socolow, A.A., 5
    - Malvern Quad.: Socolow, A.A., 6
    - Media Quad.: Socolow, A.A., 7
    - Phoenixville Quad.: Socolow, A.A., 12
    - Valley Forge Quad.: Socolow, A.A., 17
    - West Chester Quad.: Socolow, A.A., 18
- *Ground water*
  - Chester Co.: Barksdale, H.C., 1
  - springs: Meade, W., 1

Historical geology
- Precambrian: Bascom, F., 1
  - Honeybrook-Phoenixville Quads: Postel, A.W., 2
- Precambrian-Cambrian: Watson, E.H., 1
- Pleistocene, The Marsh: Deevey, E.S., Jr., 1

Maps
- aeromagnetic
  - Elverson Quad.: Bromery, R.W., 5
  - Media Quad.: Bromery, R.W., 8
  - Morgantown Quad.: Bromery, R.W., 10
  - Norristown Quad.: Bromery, R.W,. 11
  - Phoenixville Quad.: Bromery, R.W., 13
  - Valley Forge Quad.: Bromery, R.W., 18
  - West Chester Quad.: Bromery, R.W., 19
- economic, corundum: Pearre, N.C., 1
- geologic: Barksdale, H.C., 1; Rogers, H.D., 3

Mineralogy
- anglesite: Genth, F.A., 1
- anorthite: Silliman, B., Jr., 1
- bornite: Genth, F.A., 1
- brucite, popular: Thomas, C.A., 1
- bucholzite: Silliman, B., Jr., 1
- cerussite: Genth, F.A., 1
- chalcopyrite: Genth, F.A., 1
- chalcotrichite: Blake, W.P., 1
- clinopyroxene: Norton, D.A., 3
- corundellite: Silliman, B., Jr., 1
- corundum: Barlow, A.E., 2
- deweylite, popular: Thomas, C.A., 1
- emerylite: Silliman, B., Jr., 1
- euphyllite: Silliman, B., Jr., 1
- galena: Blake, W.P., 1; Genth, F.A., 1
- gersdorffite: Genth, F.A., 2
- halite: Clarke, F.W., 3
- hornblende: Rosenzweig, A., 1
- indianite: Silliman, B., Jr., 1
- jefferisite: Clarke, F.W., 2
- kyanite: Silliman, B., Jr., 1
- minerals: Carpenter, G.W., 2
- pyrite: Genth, F.A., 1
- pyromorphite: Genth, F.A., 1
- review: Carpenter, G.W., 1
- ripidolite: Clarke, F.W., 2
- rutile: Watson, T.L., 1
- sphalerite: Genth, F.A., 1
- unionite: Silliman, B., Jr., 1
- vermiculite: Brush, G.J., 2

Paleontology
- Amphibia, Triassic: Branson, E.B., 1; Colbert, E.H., 1; Cope, E.D., 1, 2
- Branchiopoda, Triassic: Bock, W., 4; Jones, T.R., 1, 4; Raymond, P.E., 3
- Marsh flora, Pleistocene: Martin, P.S., 2
- Ostracoda, Triassic: Jones, T.R., 1
- Pelecypoda, Triassic: Britton, N.L., 1
- Pisces, Triassic: Leidy, J., 1; Schaeffer, B., 2
- Reptilia, Triassic: Cope, E.D., 2, 3; McGregor, J.H., 1
- worm, Cambrian: Lyman, B.S., 5

Petrology
- anorthosite: O'Neill, B.J., Jr., 1
- crystalline rocks: Watson, E.H., 2
  - magnetite: Layman, F.G., 1
- igneous rocks: Bascom, F., 1; Waraksa, I.R., 1
  - Honeybrook-Phoenixville Quads.: Postel, A.W., 2
- metamorphic rocks: Bascom, F., 1
  - Honeybrook-Phoenixville Quads.: Postel, A.W., 2

Physiographic geology
- The Marsh, origin: Bricker, O.P., Jr., 1

CHLORITOID, *see also* Mineralogy
- Lancaster Co.: Hietanen, A.M., 1

CHROMIUM, *see also* Mineral resources
- Chester Co.: Luft, S.J., 1; Pearre, N.C., 2
- Lancaster Co.: Diffenbach, O., 1; Fisher, L.W., 1; Lapham, D.M., 1; Luft, S.J., 1; Pearre, N.C., 2

CLARION COUNTY, *see also* Pennsylvania and Pennsylvania-Western

Economic geology
- coal, bituminous, reserves: Blaylock, D.W., 2
- fire clay: Galpin, S.L., 1
- petroleum: Lesley, J.P., 6

Historical geology
- Devonian-Pennsylvanian: Lesley, J.P., 6
- Pennsylvanian, Foxburg Quad.: Angermann, T.W., 1

Petrology
- fire clay: Galpin, S.L., 1

Physiographic geology
- caves: Dunn, J.R., 4; White, W.B., 2
  - Worthless Cave: Rietz, E., 1

CLAY, *see also* Fire clay and Mineral resources
- Adams Co., Carlisle Quad.: Stose, G.W., 4
- Bucks Co.: Gault, H.R., 5
- Cambria Co., New Florence Quad.: Shaffner, M.N., 1, 5
- Central Pennsylvania: Weaver, C.E., 1, 2, 3
  - guidebook: Griffiths, J.C., 8

Centre Co.: Weaver, C.E., 4
Cumberland Co., Carlisle Quad.: Stose, G.W., 4
Dauphin Co.: Taylor, R.C., 2
Fayette Co.: Grasty, J.S., 1
Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
Lawrence Co.: Droste, J.B., 2
Lebanon Co.: Taylor, R.C., 2
McKean Co.: Colton, I.C., 1
Mercer Co.: Droste, J.B., 2
Northeastern Pennsylvania: Tedrow, J.C.F., 2
Northumberland Co.: Clarke, F.W., 1
Northwestern Pennsylvania: Droste, J.B., 1, 5; Shepps, V.C., 3
Pennsylvania
electron photomicrographs: Bates, T.F., 3
geographic description: Griffiths, J.C., 4
Somerset Co., Meyersdale Quad.: Flint, N.K., 1
New Florence Quad.: Shaffner, M.N., 1, 5
southern: Flint, N.K., 2
Venango Co., alteration: Droste, J.B., 4
Western Pennsylvania: Williams, E.G., 5
x-ray analysis: Schultz, L.G., 1
Westmoreland Co.: Grasty, J.S., 1
New Florence Quad.: Shaffner, M.N., 1, 5
York Co., Carlisle Quad.: Stose, G.W., 4

CLEARFIELD COUNTY, *see also* Pennsylvania and Pennsylvania-Western
Economic geology
coal, bituminous: Hotchkiss, J., 1; Johnson, W.R., 1; Lusk, E.W., 1
reserves: Blaylock, D.W., 1
fire clay: Galpin, S.L., 1; Hotchkiss, J., 1
iron: Hotchkiss, J., 1; Johnson, W.R., 1
limestone: Hotchkiss, J., 1; Johnson, W.R., 1
natural gas: Bolger, R.C., 3; Brown, W.B., 3d, 1
radioactive minerals: Ferm, J.C., 2
uranium, Lower Freeport Coal: Patterson, E.D., 1
Historical geology
Pennsylvanian: Johnson, W.R., 1; Nickelsen, R.P., 1; Roberts, J.L., 1; Williams, E.G., 1, 2
Maps
economic, coal, bituminous: Blaylock, D.W., 1
structure contour, Mercer Formation, Chestnut Ridge Anticline: Bolger, R.C., 3
Petrology
fire clay: Galpin, S.L., 1
shale composition: Bates, T.F., 2
Physical geology
cross bedding, Pennsylvanian: Nickelsen, R.P., 2
joints, air photo mapping: Lattman, L.H., 1

CLEAVAGE, *see also* Structural geology
Lancaster Co.: Cloos, E., 1
Monroe Co., Delaware Water Gap: Fourmarier, P.F., 1
York Co.: Cloos, E., 1

CLINOPYROXENE, *see also* Mineralogy
Chester Co.: Norton, D.A., 3
Southeastern Pennsylvania: Norton, D.A., 1, 2

CLINTON COUNTY, *see also* Pennsylvania and Pennsylvania-Central
Economic geology
fire clay: Anonymous, 8; Weltz, J.H., 2
natural gas: Cathcart, S.H., 3; Gouse, H.V., 1; Ingham, A.I., 2
Leidy Gas Fields: Ebright, J.R., 2, 3; Wilcox, Q.L., 1
Geophysical investigations
gravity, Renovo area: Jarmell, S., 1
Historical geology
Devonian: Gouse, H.V., 1
Devonian-Pennsylvanian: Ebright, J.R., 4; Ingham, A.I., 2
Leidy Gas Field: Ebright, J.R., 2, 3
Ordovician: Whitcomb, L., 1
Maps
economic, natural gas: Ebright, J.R., 4
geologic, Leidy Gas Field: Ebright, J.R., 2
structure, Hyner-Ferney area: Ebright, J.R., 4
structure contour, Leidy Gas Field,
Oriskany Sandstone: Ebright, J.R., 2; Fettke, C.R., 55
Pocono Sandstone: Ebright, J.R., 2, 3
physiographic, West Branch Susquehanna River, restored surface: Denny, C.S., 3
Paleontology
Trilobita, Ordovician: Whittington, H.B., 1
Petrology
bentonite, Devonian: Weaver, C.E., 6
talus, statistical analysis: Griffiths, J.C., 10

- **COAL**, *see also* Mineral resources
  - Pennsylvania: Bell, I.L., 1, 2; Campbell, M.R., 2; Clarke, W.B., 3; Eavanson, H.N., 2; Parker, E.W., 1; Rogers, H.D., 8; Schanz, J.J., Jr., 2; Snyder, N.H., 2; Strueve, H., 1; Theissen, R., 2; Wanless, H.R., 2; Wetherill, C.M., 1
    - analyses: Aresco, S.J., 1, 2, 3, 4, 5, 6, 7, 8; Pope, G.S., 2; Fieldner, A.C., 1, 3, 5
    - carbonization: White, C.D., 5
    - history: Robinson, C.W., 1
    - origin: Gresley, W.S., 3; Plotts, W., 1; Rafinesque, C.S., 2; White, C.D., 3
    - petrography: Channabasappa, K.C., 1; Fuchs, W., 1; McCartney, J.T., 1
    - relation to petroleum: Lilley, E.R., 1
    - reserves: Crichten, A.B., 1; Heald, K.C., 1; U. S. Geol. Survey, 1
  - *Anthracite*
    - Carbon Co.: Anonymous, 4
    - Columbia Co.: Roberts, W.F., 10
      - Ashland Quad.: Haley, B.R., 1, 2
      - Mt. Carmel Quad.: Rothrock, H.E., 3, 5
    - Dauphin Co.: Baird, T., 2; Bear Valley Coal Co., 1; Hall, J., 1; Johnson, O., 1; Roberts, W.F., 2, 8; Strong, H.K., 1; Taylor, R.C., 2
    - Lackawanna Co.: Roberts. W.F., 6; Silliman, B., Sr., 1
    - Lebanon Co.: Baird, T., 2; Roberts, W.F., 2; Strong, H.K., 1; Taylor, R.C., 2
    - Luzerne Co.: Anonymous, 1; Jones, E., 1, 2; Powell, W.B., 1; Roberts, W.F., 1, 3, 5, 7, 11, 14, 16
    - Northeastern Pennsylvania: Ashley, G.H., 5; Ashmead, D.C., 1; Jones, J.F., 1; Roberts, W.F., 9; Sheafer, P.W., 4; Stoek, H.H., 1
      - analysis: Cooper, H.M., 1
      - origin: Keyes, C.R., 1
      - petrography: Fanshawe, J.R., 1; Turner, H.G., 1, 2, 3; Wagner, H.C., 1
      - radioactive minerals: Welch, S.W., 1
      - reserves: Ash, S.H., 2; Rothrock, H.E., 1
    - Northumberland Co.: Roberts, W.F., 12
      - Mt. Carmel Quad.: Rothrock, H.E., 2, 3, 4, 5
    - Schuylkill Co.: Anonymous, 4; Baird, T., 2, 3; Bear Valley Coal Co., 1; Hall, J., 1; Johnson, O., 1; Lesley, J.P., 3; N. Y. and Schuylkill Coal Co., 1; North American Coal Co., 1; Roberts, W.F., 1, 8, 13, 14; Sheafer, P.W., 3; Strong, H.K., 1, 2
      - analysis: Rogers, H.D., 1
      - Ashland Quad.: Haley, B.R., 1, 2
      - Delano Quad.: Maxwell, J.A., 1
      - Minersville-Tremont Quads.: Wood, G.H., Jr., 2
      - Mt. Carmel Quad.: Rothrock, H.E., 5
      - Shenandoah Quad.: Danilchik, W., 1; Kehn, T.M., 1
    - Wayne Co.: Roberts, W.F., 7, 16
    - Wyoming Co.: Silliman, B., Sr., 1
  - *Bituminous*
    - Allegheny Co.: Antisell, T., 1
      - Freeport-New Kensington Quads.: Koppe, E.F., 3
      - petrography: Davis, J.D., 1; Theissen, R., 3
      - reserves: Wallace, J.J., 1
      - weathering: Porter, H.C., 1
    - Armstrong Co.
      - Freeport Quad.: Koppe, E.F., 3
      - reserves: Dowd, J.J., 3
    - Bedford Co.: Roberts, W.F., 4; Shepherd, F., 1
    - Bradford Co.: Lesley, J.P., 1
    - Butler Co., Freeport-New Kensington Quads.: Koppe, E.F., 3
    - Cameron Co.: Dickeson, M.W., 4; Shriber, R.C., 1; Warren, G., 1
    - Cambria Co.
      - New Florence Quad.: Shaffner, M.N., 1, 3, 4, 5
      - reserves: Dowd, J.J., 1
    - Central Pennsylvania, analysis: Kirgis, F.L., 1
    - Centre Co., Snoe Shoe Basin: Roberts, W.F., 17
    - Clarion Co., reserves: Blaylock, D.W., 2
    - Clearfield Co.: Hotchkiss, J., 1; Johnson, W.R., 1; Lusk, E.W., 1
      - reserves: Blaylock, D.W., 1
    - Elk Co.: Dalson, A.F., 1; Jackson, C.T., 1; Lesley, J., 1; Northwestern Pennsylvania Oil and Coal Co., 1
    - Fayette Co.: Grasty, J.S., 1; Lesley, J.P., 8; Lyman, B.S., 1; Stewart, D.S., 1
      - Donegal Quad.: Shaffner, M.N., 2
      - reserves: Dowd, J.J., 4
    - Greene Co., reserves: Wallace, J.J., 3
    - Huntingdon Co.: Roberts, W.F., 4; Shepherd, F., 1
    - Indiana Co.: Foster, W.B., 1
      - analyses: Fieldner, A.C., 4
      - New Florence Quad.: Shaffner, M.N., 1, 3, 4, 5
      - reserves: Dowd, J.J., 2
    - Jefferson Co., reserves: Dowd, J.J., 6
    - Lycoming Co.: Anonymous, 2; Dickeson, M.W., 3; Hodge, J.T., 1;

Lycoming Coal Co., 1; Ralston Coal Estate, 1; Shuttleworth, J., 1
analysis: Rogers, H.D., 1
McKean Co.: Colton, I.C., 1; Dalson. A.F., 1, 2; Hall, J., 4; Needham, B., 1; Owen, D.D., 1; Sheafer, P.W., 1
radioactive minerals, Beaver, Clearfield, Jefferson Cos.: Ferm, J.C., 2
Somerset Co.: D'Invilliers, E.V., 1; Ferguson, J.H., 1; Union Coal Co., 1; Wolff, G.D., 1
analysis: Campbell, M.R., 4, 7
Donegal Quad.: Shaffner, M.N., 2
Meyersdale Quad.: Flint, N.K., 1
New Florence Quad.: Shaffner, M.N., 1, 3, 4, 5
reserves: French, G., 1; Wallace, J.J., 2
southern: Flint, N.K., 2
Southwestern Pennsylvania: Martin, G.C., 1; Shapiro, N., 1; Swartz, C.K., 2, 3
Pittsburgh Coal: Cross, A.T., 4; Eavanson, H.N., 1
Sullivan Co., analysis: Campbell, M.R., 4
Tioga Co.: Beck, T.R., 1; Hughes, G.W., 1; Taylor, R.C., 1
Washington Co.
analysis: Campbell, M.R., 5
reserves: Wallace, J.J., 4
Western Pennsylvania: Anonymous, 3; Ashley, G.H., 4; Deasy, G.F., 2, 3; Fearon, H.B., 1; Johnston, J.K., 1; Snyder, N.H., 1; Wanless, H.R., 3; Young, W.H., 1
analysis: Campbell, M.R., 6; Davis, J.D., 2; Fieldner, A.C., 2; Harr, L., 1; Pope, G.S., 1
joints: Moore, E.S., 1
names: Anonymous, 41
partings, Freeport Coal: Koppe, E.F., 1
petrography: Parks, B.C., 1; Theissen, R., 1
radioactivity: Patterson, E.D., 1
reserves: Ashley, G.H., 6
spoil banks: Swartz, F.M., 2
Westmoreland Co.: Antisell, T., 1; Grasty, J.S., 1; Lesley, J.P., 4, 5
Donegal Quad.: Shaffner, M.N., 2
Freeport-New Kensington Quads.: Koppe, E.F., 3
New Florence Quad.: Shaffner, M.N., 1, 3, 4, 5
reserves: Dowd, J.J., 5
Cannel
McKean Co.: Colton, I.C., 1

COBALT, *see also* Cobalt-bearing minerals and Mineral resources
Huntingdon Co.: Boyé, M.H., 1

COELENTERATA, *see also* individual types
Hydrozoa, Bedford Co., Devonian: Swartz, C.K., 1

COLUMBIA COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern
Economic geology
coal, anthracite: Roberts, W.F., 10
Ashland Quad.: Haley, B.R., 1, 2
Mt. Carmel Quad.: Rothrock, H.E., 3, 5
lead: Earl, K.M., 1
zinc: Earl, K.M., 1
Historical geology
Devonian: Kindle, E.M., 1
Maps
economic, coal, anthracite
Ashland Quad.: Haley, B.R., 1, 2
Mt. Carmel Quad.: Rothrock, H.E., 5
structure, Buck Mountain-Mammoth Coal beds, Mt. Carmel Quad.: Rothrock, H.E., 5
structure contour
Ashland Quad.: Haley, B.R., 1, 2
Mt. Carmel Quad., Buck Mountain Coal: Rothrock, H.E., 3
Physiographic geology
glacial weathering: Peltier, L.C., 2

CONCRETIONS, *see also* Sedimentary structures
Northeastern Pennsylvania, Pennsylvanian: Gresley, W.S., 1

CONNATE WATER
McKean Co., Bradford Oil Field: Fettke, C.R., 47
Southwestern Pennsylvania: Reeves, F., 1
Washington Co.: Steiger, G., 1

CONODONTS
Franklin Co., Ordovician: Sando, W.J., 1
Northwestern Pennsylvania, Devonian: Hass, W.H., 1, 2

COPPER, *see also* Copper-bearing minerals and Mineral resources
Bucks Co.: Gault, H.R., 5
Chester Co.: Wherry, E.T., 1
Montgomery Co.: Earl, K.M., 3
Northcentral Pennsylvania: Brummer, J.J., 1
Northeastern Pennsylvania: Lesley, J.P., 2

CORALS, *see* Anthozoa

CORUNDELLITE, *see also* Mineralogy
- Chester Co.: Silliman, B., Jr., 1

CORUNDUM, *see also* Mineral resources and Mineralogy
- Chester Co.: Barlow, A.E., 2
- Delaware Co.: Barlow, A.E., 2
- Southeastern Pennsylvania: Pearre, N.C., 1

CRAWFORD COUNTY, *see also* Pennsylvania, Pennsylvania-Northwestern, and Pennsylvania-Western
- *Historical geology*
  - Devonian-Mississippian, Berea Sandstone: deWitt, W., Jr., 1
  - Pleistocene: Walker, P.C., 1
- *Maps*
  - geologic, Berea Sandstone, Mississippian: Pepper, J.F., 1
- *Paleontology*
  - Brachiopoda, Devonian: Hall, J., 7, 21; Schuchert, C., 1
  - Echinoidea, Devonian: Hall, J., 8; Keyes, C.R., 2
  - Gastropoda, Devonian: Hall, J., 12
  - Pelecypoda, Devonian: Hall, J., 9, 13, 15, 16, 17
  - Porifera, Devonian: Caster, K.E., 3
- *Petrology*
  - glacial till: Sitler, R.F., 1
- *Physiographic geology*
  - glacial geology: Shepps, V.C., 2; Walker, P.C., 1

CRETACEOUS PERIOD, *see also* Mesozoic Era
- Pennsylvania: Levorsen, A.I., 1

CRINOIDEA
- Blair Co., Devonian: Goldring, W., 1
- Erie Co., Devonian: Goldring, W., 1

CRUSTACEA, *see also* individual types
- Bucks Co., Triassic: McLaughlin, D.B., 6
- Erie Co., Devonian: Hall, J., 20
- Lancaster Co., Cambrian: Resser, C.E., 2
- Warren Co., Devonian: Hall, J., 20

CUMBERLAND COUNTY, *see also* Pennsylvania-Eastern and Pennsylvania-Southeastern
- *Areal geology*
  - Carlisle Quad.: Stose, G.W., 4
- *Economic geology*
  - clay, Carlisle Quad.: Stose, G.W., 4
  - iron, Carlisle Quad.: Stose, G.W., 4
  - manganese: Hoffman, J.N., 1
    - Carlisle Quad.: Stose, G.W., 4
- *Historical geology*
  - Ordovician: Stose, G.W., 2
  - Precambrian-Triassic, Carlisle Quad.: Stose, G.W., 4
- *Maps*
  - geologic, Carlisle Quad.: Stose, G.W., 4
- *Paleontology*
  - Gastropoda, Ordovician: Hall, J., 2
  - Mammalia, Pleistocene: Rafinesque, C.S., 1
  - Nautiloidea, Ordovician: Hall, J., 2
  - Pelecypoda, Ordovician: Hall, J., 2
  - Trilobita, Ordovician: Hall, J., 2
- *Petrology*
  - limestone: Clarke, F.W., 4
- *Physiographic geology*
  - caves: Smeltzer, B.L., 4
    - Hershey Cave: Smeltzer, B.L., 3
    - Peipers Cave: Anonymous, 48

DAUPHIN COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
- *Areal geology*
  - Hershey Mine area: Geyer, A.R., 1
- *Economic geology*
  - clay: Taylor, R.C., 2
  - coal, anthracite: Baird, T., 2; Bear Valley Coal Co., 1; Hall, J., 1; Johnson, O., 1; Roberts, W.F., 2, 8; Strong, H.K., 1; Taylor, R.C., 2
  - fire clay: Taylor, R.C., 2
  - Iron: Hall, J., 1; Taylor, R.C., 2
  - radioactive minerals: Klemic, H., 3
- *Ground water*
  - Hershey Valley: Foose, R.M., 2, 4
  - relation to lithology: Foose, R.M., 1
- *Historical geology*
  - Ordovician: Stose, G.W., 2
  - Silurian: Swartz, F.M., 13
- *Maps*
  - economic, coal, anthracite: Baird, T., 2; Taylor, R.C., 2
- *Paleontology*
  - Blastoidea, Devonian: Cramer, H.R., 3
  - Nautiloidea, Devonian: Cramer, H.R., 3
  - spores (?), Devonian: Cramer, H.R., 3
- *Petrography*
  - sandstone: Clarke, F.W., 4
- *Physical geology*
  - joints: Sheppard, R.A., 1
  - stylolites: Prouty, C.E., 2

DELAWARE COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
- *Areal geology*
  - Foxcroft area: Armstrong, J.C., 1
  - Ithan Creek area: Auerbach, P.D., 1
- *Geophysical investigations*
  - aeromagnetic
    - Media Quad.: Socolow, A.A., 7

Norristown Quad.: Socolow, A.A., 10
Valley Forge Quad.: Socolow, A.A., 17
West Chester Quad.: Socolow, A.A., 18
Ground water
Delaware Co.: Barksdale, H.C., 1
Historical geology
Precambrian: Ward, R.F., 1
Precambrian-Cambrian: Watson, E.H., 1
radioactive dating: Jaffe, H.W., 1
Maps
aeromagnetic
Media Quad.: Bromery, R.W., 8
Norristown Quad.: Bromery, R.W., 11
Valley Forge Quad.: Bromery, R.W., 18
West Chester Quad.: Bromery, R.W., 19
economic, corundum: Pearre, N.C., 1
geologic: Barksdale, H.C., 1
Mineralogy
brucite, popular: Thomas, C.A., 1
corundum: Barlow, A.E., 2
deweylite, popular: Thomas., C.A., 1
feldspar: Penfield, S.L., 1
hypersthene: Clavan, W., 1
kyanite: Dike, P.A., 2
serpentine: Genth, F.A., 4
sillimanite: Greig, J.W., 1; Navais, L., 1; Roy, R., 1; Wycoff, R.W.G., 1
vermiculite: Clarke, F.W., 3
Petrology
gabbro: Greenwood, R., 1
igneous rocks, Springfield Quarry: Berman, J., 1
schist: Tomlinson, W.H., 4
Wilmington Complex, Precambrian: Ward, R.F., 1
Wissahickon Formation: Dike, P.A., 1
xenoliths: Tomlinson, W.H., 3

DEVONIAN PERIOD, *see also* Paleozoic Era
Bedford Co.: Prosser, C.S., 1; Wintermute, T.J., 1
Bedford Quad.: Turley, M.R., 1
Blair Co.: Swartz, F.M., 8; Wimmer, P., 1
Bradford Co.: Fettke, C.R., 12; Kreidler, W.L., 1
Butler, Co.: Fettke, C.R., 15; Lytle, W.S., 10
Butler Quad.: Lytle, W.S., 3
Cambria Co., New Florence Quad.: Shaffner, M.N., 1
Cameron Co.: Bolger, R.C., 6; Fettke, C.R., 43
Driftwood Quad.: Bolger, R.C., 5
Carbon Co.: Willard, B., 16
Central Pennsylvania: Arndt, H.H., 1; Linn, E.H., 1; Swartz, F.M., 5; Willard, B., 17
Centre Co.: Ebright, J.R., 4
Clarion Co.: Lesley, J.P., 6
Clinton Co.: Ebright, J.R., 4; Ingham, A.I., 2
Leidy Gas Field: Ebright, J.R., 2, 3; Gouse, H.V., 1
Columbia Co.: Kindle, E.M., 1
Crawford Co., Berea Sandstone: deWitt, W., Jr., 1
Eastern Pennsylvania: Willard, B., 8
Elk Co.: Ashburner, C.A., 1; Fettke, C.R., 35, 37
Driftwood Quad.: Bolger, R.C., 5
Erie Co.: Chadwick, G.H., 1; Wagner, W.R., 3; Fettke, C.R., 11, 23
Berea Sandstone: deWitt, W., Jr., 1
Fayette Co.: Haney, W.D., 1; Sherrill, R.E., 1
Donegal Quad.: Shaffner, M.N., 2
Forest Co.: Fettke, C.R., 10
Sheffield Quad.: Ingham, A.I., 3
Fulton Co.: Prosser, C.S., 1, 2
Orbisonia Quad.: Dobbins, D.A., 1
Huntingdon Co.: Swain, F.M., Jr., 3
Allensville Quad.: Dort, W., Jr., 5
Orbisonia Quad.: Dobbins, D.A., 1
Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
Jefferson Co.: Swartz, F.M., 8
Luzerne Co.: Roberts, W.F., 15
Lycoming Co.: Ebright, J.R., 4
McKean Co.: Ashburner, C.A., 1; Fettke, C.R., 7, 9, 16, 17, 18, 22, 26, 27, 30, 32; Hoffacker. B.L., Jr., 1; Russell, E.L., Sr., 1
Bradford Oil Field: Fettke, C.R., 49
Bradford Quad.: Fettke, C.R., 39
Smethport Quad.: Seifert, W.H., 1
Mercer Co.: Wagner, W.R., 2
Mifflin Co.: Swain, F.M., Jr., 3
Monroe Co.: Beerbower, J.R., 1; Cooper, G.A., 1
Delaware Water Gap Quad.: Kurtz, A.E., 1
Northeastern Pennsylvania: Arndt, H.H., 1; Dyson, J.L., 2; Johnson, M.E., 4; McGucken, J.G., 1; Read, E.W., 1; Willard, B., 5
Schoharie Formation: Johnsen, J.H., 1
Northern Pennsylvania: Chadwick, G.H., 5; Fettke, C.R., 34; Williams, H.S., 1
Northwestern Pennsylvania: Cathcart, S.H., 2; Chadwick, G.H., 2, 3; Greiner, H., 1; Lytle, W.S., 13; Tesmer, I.H., 1; Wright, W., 1

- Pennsylvania: Hall, J., 11; Jones, T.H., 2; Miller, J.T., 3; Reeside, J.B., Jr., 1; Schmidt, H., 1; Schuchert, C., 2, 5, 6; Sutton, R.G., 1; Swartz, F.M., 1; Willard, B., 6
  - Marcellus Shale: Rich, J.L., 3
- Potter Co.: Fettke, C.R., 6, 25; Kreidler, W.L., 1; Woodruff, J.G., 1
  - Driftwood Quad.: Bolger, R.C., 5
- Snyder Co.: Wagner, W.R., 1
- Somerset Co.
  - Donegal Quad.: Shaffner, M.N., 2
  - Meyersdale Quad.: Flint, N.K., 1
  - New Florence Quad.: Shaffner, M.N., 1
  - southern: Flint, N.K., 2
- Southwestern Pennsylvania, bentonite: Flowers, R.R., 1
- Susquehanna Co.: Kreidler, W.L., 1; Vanuxem, L., 1
- Tioga Co.: Cobb, R.E., 1; Fettke, C.R., 13, 21; Harding, R.W., 1; Kreidler, W.L., 1
- Venango Co.: Lytle, W.S., 10, 12
  - Berea Sandstone: deWitt, W., Jr., 1
- Warren Co.: Fettke, C.R., 8, 19, 20, 24, 29, 33
  - Sheffield Quad.: Ingham, A.I., 3
- Western Pennsylvania: Fettke, C.R., 42, 55; Lytle, W.S., 2; Morisawa, M.E., 1; Murphy, A.E., 1; Robinson, J.F., 1
  - bentonite: Fettke, C.R., 41
- Westmoreland Co.
  - Donegal Quad.: Shaffner, M.N., 2
  - New Florence Quad.: Shaffner, M.N., 1, 5

DEWEYLITE, *see also* Mineralogy
- Chester-Delaware Cos., popular: Thomas, C.A., 1

DIABASE, *see also* Igneous rocks
- Berks Co., Ordovician: Buckwalter, T.V., Jr., 4
- Lancaster Co., schist-assimilation: Tomlinson, W.H., 1
- Lebanon Co.: Edie, R.W., 1; Gray, C., 10
- Southeastern Pennsylvania
  - geographic controls: Myers, R.E., 5
  - granophyre-bearing: Hotz, P.E., 2
  - Triassic: Darton, N.H., 1; Hotz, P.E., 3
- York Co., granophyre-bearing: Hotz, P.E., 4

DIORITE, *see also* Igneous rocks
- Lebanon Co., Ordovician: Moseley, J.R., 6

DOLOMITE, *see also* Mineral resources and Mineralogy
- Central Pennsylvania, origin: Krynine, P.D., 4
- Lancaster Co.: Garrett, T.H., 1

DRAINAGE CHANGES, *see also* Physiography
- Southwestern Pennsylvania, Pittsburgh River, Pleistocene: Stout, W.E., 2
- Western Pennsylvania, Pleistocene: Stout, W.E., 1

DRAINAGE PATTERNS, *see also* Physiography
- Cameron Co., long profiles: Broscoe, A.J., 2
- Central Pennsylvania: Brush, L.M., Jr., 1, 2
- Eastern Pennsylvania, transverse: Carlston, C.W., 1
- Pennsylvania: Davis, W.M., 1; Meyerhoff, H.A., 1; Strahler, A.N., 1
  - Pennsylvanian: Friedman, S.A., 1
- Potter Co., long profiles: Broscoe, A.J., 2
- Southcentral Pennsylvania, stream asymmetry: Broscoe, A.J., 1

DRILLING AND CORING
- Eastern Pennsylvania, tunnels: Ash, S.H., 3

EARTHQUAKES
- Berks Co.: Murphy, L.M., 2, 3
- Erie Co.: Heck, N.H., 2
- Lehigh Co.: Heck, N.H., 2; Murphy, L.M., 1
- Luzerne Co.: Murphy, L.M., 2
- Pennsylvania: Heck, N.H., 1, 3
- Philadelphia Co.: Heck, N.H., 2

ECHINOIDEA
- Crawford Co., Devonian: Hall, J., 8; Keyes, C.R., 2

ECHINODERMATA, *see also* individual types
- Cystoidea, Bedford-Perry Cos., Silurian: Schuchert, C., 3
- Edrioasteroidea
  - Devonian, Tioga Co.: Clarke, J.M., 2
  - Mississippian, Warren Co.: Clarke, J.M., 2; Foerste, A.F., 1

ELK COUNTY, *see also* Pennsylvania, Pennsylvania-Northern, and Pennsylvania-Northwestern

Economic geology
- coal, bituminous: Dalson, A.F., 1; Jackson, C.T., 1; Lesley, J., 1; Northwestern Pennsylvania Oil and Coal Co., 1

  - iron: Dalson, A.F., 1; Jackson, C.T., 1; Northwestern Pennsylvania Oil and Coal Co., 1
  - limestone: Jackson, C.T., 1
  - natural gas: Bolger, R.C., 3; Brown, W.B., 3d, 1
    - Driftwood-Benzette Field: Bolger, R.C., 4
    - Driftwood Quad.: Bolger, R.C., 5
  - petroleum: Northwestern Pennsylvania Oil and Coal Co., 1
  - sandstone: Jackson, C.T., 1
- *Historical geology*
  - Devonian-Mississippian: Ashburner, C.A., 1
  - Devonian-Pennsylvanian, Driftwood Quad.: Bolger, R.C., 5
  - Ordovician-Mississippian: Fettke, C.R., 35, 37
  - Pennsylvanian: Lesley, J., 1
- *Maps*
  - economic, coal, bituminous: Dalson, A.F., 1
  - structure, Driftwood Quad.: Bolger, R.C., 5
  - structure contour
    - Mercer Formation, Driftwood Anticline: Bolger, R.C., 3
    - Oriskany Sandstone, Driftwood-Benzette Gas Field: Fettke, C.R., 55
- *Paleontology*
  - seed pod, Pennsylvanian, popular: Hamilton, H.V., 3
- *Physical geology*
  - structure, Driftwood Quad.: Bolger, R.C., 5

EMERALD NICKEL, *see also* Kammererite and Mineralogy
- Lancaster Co.: Garrett, T.H., 1

EMERYLITE, *see also* Mineralogy
- Chester Co.: Silliman, B., Jr., 1

ENGINEERING GEOLOGY
- Allegheny Co.: Philbrick, S.S., 3
  - Crooked Creek dam site: Philbrick, S.S., 1
  - faulting problems: Ferguson, H.F., 1
  - landslides: Ackenheil, A.C., 1
  - problems: Melvin, J.H., 1
  - tunnels, portal stability: Ackenheil, A.C., 2
- Beaver Co.: Philbrick, S.S., 3
- Bedford Co.
  - Hollidaysburg Quad.: U. S. Geol. Survey Engineering Geology and Ground Water Branches, 1
  - tunnel strength: Gilbert, G.K., 1
- Blair Co., Hollidaysburg Quad.: U. S. Geol. Survey Engineering Geology and Ground Water Branches, 1
- Fayette Co., Youghiogheny Dam: Philbrick, S.S., 2
- Huntingdon Co., Hollidaysburg Quad.: U. S. Geol. Survey Engineering Geology and Ground Water Branches, 1
- Northeastern Pennsylvania
  - mine seepage: Ash, S.H., 4
  - tunnels, anthracite-mine drainage: Ash, S.H., 3, 5
  - turnpike construction: Shurig, D.G., 1
- Pennsylvania
  - highway engineering: Gray, C., 11
  - underground petroleum storage: Fettke, C.R., 54
- Western Pennsylvania, Pennsylvania Turnpike: Cleaves, A.B., 2
- Westmoreland Co., East Bow railroad cut: Philbrick, S.S., 2

EPSOMITE, *see also* Mineralogy
- Indiana Co.: Boyé, M.H., 2

ERIE COUNTY, *see also* Pennsylvania, Pennsylvania-Northern, Pennsylvania-Northwestern, and Pennsylvania-Western
- *Geochemical investigations*
  - radiocarbon dating: Droste, J.B., 6; Rubin, M., 1
- *Ground water*
  - Erie shore area: Mangan, J.W., 2
- *Historical geology*
  - Cambrian-Devonian: Wagner, W.R., 3
  - Cambrian-Pleistocene: Fettke, C.R., 14
  - Devonian: Chadwick, G.H., 1
  - Devonian-Mississippian, Berea Sandstone: deWitt, W., Jr., 1
  - Ordovician-Pleistocene: Fettke, C.R., 11, 23
  - Pleistocene: Droste, J.B., 6; Shepps, V.C., 1, 2, 3, 4; Rubin, M., 1
- *Paleontology*
  - Brachiopoda, Devonian: Schuchert, C., 1
  - Crinoidea, Devonian: Goldring, W., 1
  - Crustacea, Devonian: Hall, J., 20
  - Eurypterida, Devonian: Hall, J., 20; Harlan, R., 2
  - Porifera, Devonian: Caster, K.E., 3; Clarke, J.M., 6; Hall, J., 14, 23
- *Petrology*
  - bentonite, Devonian: Weaver, C.E., 6
  - glacial till: Sitler, R.F., 1
- *Physical geology*
  - earthquake: Heck, N.H., 2
  - horizontal strata: Ellicott, A., 1
- *Physiographic geology*
  - glacial geology: Leverett, F., 3; Shepps, V.C., 2

glacial lakes: Fairchild, H.L., 2; Hough, J.L., 1; Leverett, F., 3
  Lake Warren beaches: Spencer, J.W.W., 1

EROSION
  Southwestern Pennsylvania: Glenn, L.C., 1

EUPHYLLITE, *see also* Mineralogy
  Chester Co.: Silliman, B., Jr., 1

EURYPTERIDA
  Beaver Co., Pennsylvanian: Cope, E.D., 4, 6; Kjellesvig-Waering, E.N., 1, 2; O'Connell, M., 1
  Devonian, restoration: Beecher, C.E., 1
  Erie Co., Devonian: Hall, J., 20; Harlan, R., 2
  Fulton Co., Silurian: O'Connell, M., 1
  Lebanon Co., Silurian: O'Connell, M., 1
  Monroe Co., Silurian: O'Connell, M., 1
  Venango Co., Pennsylvanian: Kjellesvig-Waering, E.N., 1; O'Connell, M., 1
  Warren Co.
    Devonian: Kjelleswig-Waering, E.N., 1
    Mississippian: O'Connell, M., 1

FAULTS AND FAULTING, *see also* Structural geology, Thrusts and thrust faulting
  Allegheny Co., relation to engineering: Ferguson, H.F., 1
  Bedford Co.: Ewing, D.J., 1
  Berks Co.
    Evansville area: Gray, C., 1
    Schuylkill Gap: Burtner, R., 1
  Carbon Co.: Engel, G.W., 1
  Central Pennsylvania, Appalachian Front: Dort, W., Jr., 4
  Lebanon Co., Martinsburg Formation: Moseley, J.R., 4
  Montgomery Co., Triassic: Watson, E.H., 3
  Pennsylvania: Willis, B., 1
    Appalachian Mountains: Rodgers, J., 2
  Schuylkill Co., Schuylkill Gap: Burtner, R., 1
  Southeastern Pennsylvania: King, B.C., 1
    Blue Ridge Front: White, W.A., 1
    Triassic: Bain, G.W., 1

FAYETTE COUNTY, *see also* Pennsylvania, Pennsylvania-Southwestern, and Pennsylvania-Western
 Areal geology
  Chestnut Ridge Anticline: Wilson, T.C., 1
  Donegal Quad.: Shaffner, M.N., 2
 Economic geology
  clay: Grasty, J.S., 1
  coal, bituminous: Grasty, J.S., 1; Lesley, J.P., 8; Lyman, B.S., 1; Stewart, D.S., 1
    Donegal Quad.: Shaffner, M.N., 2
    reserves: Dowd, J.J., 4
  fire clay: Donegal Quad.: Shaffner, M.N., 2
  iron: Lyman, B.S., 1; Stewart, D.S., 1
  limestone: Grasty, J.S., 1; Lesley, J.P., 8; Lyman, B.S., 1
    Donegal Quad.: Shaffner, M.N., 2
  natural gas: Grasty, J.S., 1
    Donegal Quad.: Shaffner, M.N., 2
  sandstone: Donegal Quad.: Shaffner, M.N., 2
  shale, Donegal Quad.: Shaffner, M.N., 2
 Engineering geology
  Youghiogheny Dam site: Philbrick, S.S., 2
 Historical geology
  Devonian: Haney, W.D., 1
  Devonian-Pennsylvanian: Sherrill, R.E., 1
    Donegal Quad.: Shaffner, M.N., 2
  Pennsylvanian: Lyman, B.S., 1; Stewart, D.S., 1
 Maps
  economic
    coal, bituminous: Dowd, J.J., 4
    mineral resources, Donegal Quad.: Shaffner, M.N., 2
  geologic, Donegal Quad.: Shaffner, M.N., 2
  structure contour, Donegal Quad., Lower Kittanning Coal: Shaffner, M.N., 2
 Paleontology
  Nautiloidea, Devonian: Flower, R.H., 1
  Pelecypoda, Devonian: Hall, J., 17
 Petrology
  Chemung Formation: Haney, W.D., 1
 Physical geology
  joints: Smith, L.B., 1
 Physiographic geology
  caves: Dunn, J.R., 4
    Casparis Cave: Dunn, J.R., 2
    Jumonville Cave: Dunn, J.R., 3, 4
    Franks Cave: Dunn, J.R., 5

FELDSPAR, *see also* Mineral resources
  Delaware Co., barium-bearing: Penfield, S.L., 1
  Southeastern Pennsylvania: Hopkins, T.C., 2

FIRE CLAY, *see also* Mineral resources
  Central Pennsylvania, origin: Bolger, R.C., 2
  Centre Co.: Weitz, J.H., 2
  Clarion Co.: Galpin, S.L., 1

Clearfield Co.: Galpin, S.L., 1; Hotchkiss, J., 1
Clinton Co.: Anonymous, 8; Weitz, J.H., 2
Dauphin Co.: Taylor, R.C., 2
Fayette Co., Donegal Quad.: Shaffner, M.N., 2
Indiana Co.: Hopkins, T.C., 3
Lebanon Co.: Taylor, R.C., 2
Lycoming Co.: Hodge, J.T., 1; Ralston Coal Estate, 1
McKean Co.: Needham, B., 1; Sheafer, P.W., 1
Northern Pennsylvania, analysis: Bolger, R.C., 1
Pennsylvania: Greaves-Walker, A.F., 1
Somerset Co.: Hall, G.M., 1
  Donegal Quad.: Shaffner, M.N., 2
Tioga Co.: Taylor, R.C., 1
Washington Co.: Lesley, J.P., 5
Western Pennsylvania: Hopkins, T.C., 1
  Mercer Clay, petrography: Weitz, J.H., 1
Westmoreland Co.: Hopkins, T.C., 3
  Donegal Quad.: Shaffner, M.N., 2

FOLDS AND FOLDING, *see also* Structural geology
Adams Co.: Cloos, E., 3
Berks Co., Evansville area: Gray, C., 1
Carbon Co.: Dyson, J.L., 4; Engel, G.W., 1
Central Pennsylvania, Appalachian Foreland: Ebright, J.R., 1
Franklin Co.: Cloos, E., 3
Lancaster Co.: Wise, D.U., 2
Lebanon Co., recumbent: Gray, C., 6
Pennsylvania, Appalachian Mountains: Rodgers, J., 2
Southeastern Pennsylvania: King, B.C., 1

FORAMINIFERA
Southwestern Pennsylvania, Mississippian: Wray, J.L., 2

FOREST COUNTY, *see also* Pennsylvania, Pennsylvania-Northwestern, and Pennsylvania-Western
Economic geology
natural gas, Sheffield Quad.: Ingham, A.I., 3
petroleum, Sheffield Quad.: Ingham, A.I., 3
Historical geology
Devonian-Pennsylvanian: Fettke, C.R., 10
  Sheffield Quad.: Ingham, A.I., 3
Maps
economic, petroleum and natural gas: Ingham, A.I., 3
isopach, Sheffield Quad.
  Balltown Sandstone: Ingham, A.I., 3
  Cherry Grove Sandstone: Ingham, A.I., 3
  Clarendon Sandstone: Ingham, A.I., 3
  Cooper Sandstone: Ingham, A.I., 3
structure contour, Sheffield Quad.
  Corry Sandstone: Ingham, A.I., 3
  Pink Rock Sandstone: Ingham, A.I., 3

FRANKLIN COUNTY, *see also* Pennsylvania and Pennsylvania-Central
Economic geology
lignite: Lesley, J.P., 7
limestone: Swartz, F.M., 9
manganese: Hoffman, J.N., 1
Historical geology
Cambrian-Ordovician: Palacas, J.G., 1
Ordovician: Neuman, R.B., 1
  Beekmantown Group: Sando, W.J., 1
radioactive dating: Jaffe, H.W., 1
Tertiary: Lesley, J.P., 7
Paleontology
algae, Ordovician: Neuman, R.B., 1
Anthozoa, Ordovician: Bassler, R.S., 4; Neuman, R.B., 1
Brachiopoda, Ordovician: Neuman, R.B., 1; Ulrich, E.O., 5
Gastropoda, Ordovician: Neuman, R.B., 1
Nautiloidea, Ordovician: Ulrich, E.O., 6
Ostracoda
  Ordovician: Swain, F.M., 2
  Silurian: Swartz, C.K., 5
Trilobita
  Cambrian: Rasetti, F.R.D., 1; Resser, C.E., 7; Walcott, C.D., 4
  Ordovician: Cooper, B.N., 1
Petrography
igneous rocks: Washington, H.S., 1
Physical geology
flowage in folds: Cloos, E., 3
stylolites: Prouty, C.E., 2
Physiographic geology
caves: Smeltzer, B.L., 4
  Needy Cave: Smeltzer, B.L., 5
  Woodchuck Cave: Smeltzer, B.L., 3

FUCOIDS
Blair Co., Silurian: Becker, H.F., 1
Mifflin Co., Silurian: Harlan, R., 2, 4
Pennsylvania, Silurian: Goeppert, J.H.R., 2
Perry Co., Devonian: Rafinesque, C.S., 3
Western Pennsylvania, Silurian: Harlan, R., 2

FULTON COUNTY, *see also* Pennsylvania, Pennsylvania-Central, and Pennsylvania-Southcentral
- *Economic geology*
  - barite: Socolow, A.A., 19
  - radioactive minerals: Klemic, H., 3
- *Historical geology*
  - Devonian: Prosser, C.S., 1, 2
    - Orbisonia Quad.: Dobbins, D.A., 1
- *Paleontology*
  - Brachiopoda, Devonian: Clarke, J.M., 3
  - Eurypterida, Silurian: O'Connell, M., 1
- *Physical geology*
  - Appalachian deformation: Gair, J.E., 1
- *Physiographic geology*
  - Garland Cave: Klein, M.M., 1

GABBRO, *see also* Igneous rocks
- Delaware Co.: Greenwood, R., 1

GALENA, *see also* Mineral resources
- Chester Co.: Blake, W.P., 1; Genth, F.A., 1

GAS, *see* Natural gas

GASTROPODA, *see also* Mollusca
- Allegheny Co.
  - Pennsylvanian: Meek, F.B., 1
  - Pleistocene: MacMillan, G.K., 1
- Bedford Co.
  - Devonian: Ohern, D.W., 1
  - Ordovician: Rafinesque, C.S., 5
  - Silurian: Swartz, C.K., 5
- Crawford Co., Devonian: Hall, J., 12
- Cumberland Co., Ordovician: Hall, J., 2
- Franklin Co., Ordovician: Neuman, R.B., 1; Sando, W.J., 1
- Luzerne Co., Pennsylvanian: Chow, M.M., 1
- Montgomery Co., Ordovician: Richards, H.G., 3
- Venango Co., Mississippian: Winchell, A., 1

GEMS, *see also* Mineralogy and individual types
- Pennsylvania: Schlegel, D.M., 1
- Southeastern Pennsylvania: Hamlin, A.C., 1; Kunz, G.F., 1; Sinkankas, J., 1

GEOBOTANICAL INVESTIGATIONS
- Bedford Co., Brallier Shale: Platt, R.B., 1
- Lancaster Co., nickel: Good, R.S., 1
- Northampton Co., Bethlehem area: Stingelin, R.W., 1

GEOCHEMICAL INVESTIGATIONS
- bitumen, Huntingdon-Mifflin Cos., Devonian: Swain, F.M., Jr., 3
- germanium, Pennsylvania coal: Stadnichenko, T.M., 2
- trace element analyses, Pennsylvania coal: Degens, E.T., 1, 2; Stadnichenko, T.M., 1

GEOLOGICAL FORMATIONS, *see also* Type sections
- Axemann Limestone, Ordovician, Central Pennsylvania: Macaulay, G.R., 1
- Baltimore Gneiss, Precambrian, Southeastern Pennsylvania: Davis, G.L., 1
- Bedford Shale, Mississippian, Western Pennsylvania: Pepper, J.F., 1
- Beekmantown Formation, Ordovician, Berks Co.: Hobson, J.P., Jr., 1
- Berea Sandstone
  - Devonian-Mississippian, Northwestern Pennsylvania: deWitt, W., Jr., 1
  - Mississippian, Western Pennsylvania: Pepper, J.F., 1
- Bradford Third Sand, Devonian, Tioga Co.: Harding, R.W., 1
- Conestoga Limestone, Ordovician, Lancaster Co.: Cramer, H.R., 1; Wise, D.U., 1
- Conococheague Limestone, Cambrian, Central Pennsylvania: Long, M.B., 1
- Cuyahoga Formation. Mississippian, Northwestern Pennsylvania: Szmuc, E.J., 1
- Honesdale Sandstone, Devonian, Northeastern Pennsylvania: Read, E.W., 1
- Jacksonburg Formation, Ordovician, Eastern Pennsylvania: Ray, S.B., 1
- Larke Dolomite, Ordovician, Central Pennsylvania: Prouty, C.E., 3
- Limeport Formation, Cambrian, Bucks Co.: Anonymous, 43
- Lockatong Argillite, Triassic, Southeastern Pennsylvania: Van Houten, F.B., 1
- Martinsburg Formation, Ordovician
  - Berks Co.: Moseley, J.R., 2
  - Lebanon Co.: Moseley, J.R., 5
- Mercer Limestone, Pennsylvanian, Western Pennsylvania: Mark, C.G., 1
- Oriskany Sandstone, Devonian: Ingram, R.J., 1; Rosenfeld, M.A., 3
- Oswego Sandstone, Ordovician, Western Pennsylvania: Lanning, D.R., 1
- Pittsburgh Coal, Pennsylvanian, Southwestern Pennsylvania: Cross, A.T., 4, 7; Eavanson, H.N., 1

- Pochuck Gneiss, Precambrian, Southeastern Pennsylvania: Buckwalter, T.V., Jr., 1
- Pocono Sandstone, Mississippian
  - Northeastern Pennsylvania: Leonard, A.D., 1
  - Southwestern Pennsylvania: Dodson, C.L., 1
- Pottsville Formation, Pennsylvanian, Northeastern Pennsylvania: Wood, G.H., Jr., 1
- Schoharie Formation, Devonian, Northeastern Pennsylvania: Johnsen, J.H., 1
- Shawangunk Grit, Silurian, Eastern Pennsylvania: Billingsley, P., 1
- Shenango Formation, Mississippian, Northwestern Pennsylvania: Szmuc, E.J., 1
- Stonehenge Limestone, Ordovician, Central Pennsylvania: Donaldson, A.C., 1
- Trenton Gravel, Recent, Southeastern Pennsylvania: Lewis, H.C., 2
- Vanport Limestone, Pennsylvanian, Northwestern Pennsylvania: Angermann, T.W., 1
- Wissahickon Formation, Precambrian
  - Delaware Co.: Dike, P.A., 1
  - Philadelphia Co.: Wyckoff, D., 1

GEOPHYSICAL INVESTIGATIONS

- aeromagnetic
  - Berks Co.
    - East Greenville Quad.: Socolow, A.A., 4
    - Elverson Quad.: Socolow, A.A., 5
    - Morgantown Quad.: Socolow, A.A., 9
    - Sassamansville Quad.: Socolow, A.A., 16
  - Bucks Co.
    - Buckingham Quad.: Socolow, A.A., 2
    - Lambertville Quad.: Socolow, A.A., 2
    - Milford Square Quad.: Socolow, A.A., 8
    - Perkiomenville Quad.: Socolow, A.A., 11
    - Quakertown Quad.: Socolow, A.A., 13
    - Stockton Quad.: Socolow, A.A., 2
  - Central Pennsylvania: Vacquier, V., 1
  - Chester Co.
    - Elverson Quad.: Socolow, A.A., 5
    - Malvern Quad.: Socolow, A.A., 6
    - Media Quad.: Socolow, A.A., 7
    - Phoenixville Quad.: Socolow, A.A., 12
    - Valley Forge Quad.: Socolow, A.A., 17
    - West Chester Quad.: Socolow, A.A., 18
  - Delaware Co.
    - Media Quad.: Socolow, A.A., 7
    - Norristown Quad.: Socolow, A.A., 10
    - Valley Forge Quad.: Socolow, A.A., 17
    - West Chester Quad.: Socolow, A.A., 18
  - Lancaster Co.
    - Conestoga Quad.: Socolow, A.A., 3
    - Morgantown Quad.: Socolow, A.A., 9
    - Quarryville Quad.: Socolow, A.A., 14
    - Safe Harbor Quad.: Socolow, A.A., 15
  - Lehigh Co.
    - Allentown Quad.: Socolow, A.A., 1
    - East Greenville Quad.: Socolow, A.A., 4
    - Milford Square Quad.: Socolow, A.A., 8
  - Montgomery Co.
    - East Greenville Quad.: Socolow, A.A., 4
    - Milford Square Quad.: Socolow, A.A., 8
    - Norristown Quad.: Socolow, A.A., 10
    - Perkiomenville Quad.: Socolow, A.A., 11
    - Phoenixville Quad.: Socolow, A.A., 12
    - Sassamansville Quad.: Socolow, A.A., 16
    - Valley Forge Quad.: Socolow, A.A., 17
  - Northampton Co., Allentown Quad.: Socolow, A.A., 1
  - Southeastern Pennsylvania: Bromery, R.W., 20; Griscom, A., 1; Jensen, H., 1; Zietz, I., 1
  - York Co., Safe Harbor Quad.: Socolow, A.A., 15
- Dip needle traverse, Lancaster-Montgomery Cos.: Randall, J.A., 1
- electrical logging, McKean-Venango Cos.: Gillingham, W.J., 1
- electrical resistivity
  - Carbon Co.: Scharon, H.L., 2
  - Central Pennsylvania: Ansari, A.M.A., 1; Gross, G.W., 1
  - Lehigh Co.: Scharon, H.L., 2
  - McKean Co.: Howell, B.F., Jr., 1
  - Pennsylvania Turnpike: Scharon, H.L., 1
- gamma ray log

  - Armstrong-Indiana Cos., Elders Ridge Quad.: Payne, F.R., Jr., 1
  - Central Pennsylvania: Kardos, W.G., 1
- gravity
  - Bradford Co.: Duecker, J.C., 1
  - Central Pennsylvania: Bacon, L.O., 1; Howell, B.F., Jr., 3
  - Clinton Co.: Jarmell, S., 1
  - Northcentral Pennsylvania: Vozoff, K., 1
  - Pennsylvania: Hammer, S., 1; Woollard, G.P., 1
  - Susquehanna Co.: Duecker, J.C., 1
  - Tioga Co.: Howell, B.F., Jr., 2
- magnetic
  - Berks Co.: Hawkes, H.E., Jr., 1
  - Northampton Co.: Kell, J.A., 1
  - Southeastern Pennsylvania: Socolow, A.A., 20
- seismic
  - Greene Co.: Schroyer, J.B., 1
  - Mifflin Co.: Katz, S., 1
  - Northampton Co.: Linehan, D., 1
  - Pennsylvania: Lyons, P.L., 1
- self potential, Central Pennsylvania: Gross, G.W., 2
- x-ray analysis
  - brucite, Lancaster Co.: Brindley, G.W., 1
  - slate, Lehigh Co.: Anderson, H.V., 1

GERMANIUM
- Pennsylvania, coal: Stadnichenko, T.M., 2

GERSDORFFITE, *see also* Mineralogy
- Chester Co.: Genth, F.A., 2

GLACIAL GEOLOGY, *see also* Glacial lakes and Physiography
- Allegheny Co., Monongahela River: Shaw, E.W., 1
- Beaver Co.: Preston, F.W., 1
- Bucks Co.: Peltier, L.C., 3
- Central Pennsylvania, terraces, Susquehanna River: Kauffman, M.E., 1; Peltier, L.C., 1
- Columbia Co., periglacial weathering: Peltier, L.C., 2
- Crawford Co.: Shepps, V.C., 2; Sitler, R.F., 1; Walker, P.C., 1
- Eastern Pennsylvania, Delaware River Valley: Chamberlin, T.C., 2
- Erie Co.: Fairchild, H.L., 2; Leverett, F., 3; Shepps, V.C., 2; Sitler, R.F., 1
  - glacial lakes: Hough, J.L., 1
  - Lake Warren beaches: Spencer, J.W.W., 1
- Lawrence Co.: Preston, F.W., 1; Sitler, R.F., 1
  - Beaver River Valley: Wright, G.F., 1
- Luzerne Co., Susquehanna River Valley: Ash, S.H., 1
- Monroe Co.: MacClintock, P., 2
- Northcentral Pennsylvania, drift mounds: Corss, F., 1
- Northampton Co.: MacClintock, P., 2
- Northeastern Pennsylvania: Heilprin, A., 1
- Northern Pennsylvania: Denny, C.S., 2; MacClintock, P., 1
  - striae: Chamberlin, T.C., 1; Lewis, H.C., 3
  - post glacial uplift: Fairchild, H.L., 3
- Northwestern Pennsylvania: Droste, J.B., 5; Hough, J.L., 2; Leverett, F., 2; Shepps, V.C., 1, 3, 4; Sitler, R.F., 2, 3; White, G.W., 2
- Pennsylvania: Antevs, E.V., 2; Deeley, R.M., 1
  - glacial boundaries: Antevs, E.V., 1; Pittlekow, J., 1
  - popular: Newberry, J.S., 3
- Potter Co.
  - Genessee Quad.: Denny, C.S., 3
  - periglacial features: Denny, C.S., 1; Goodlet, J.C., 1
- Southeastern Pennsylvania, Great Valley: Bassler, H., 1
- Southwestern Pennsylvania, Ohio River: White, I.C., 3
- Western Pennsylvania: Sitler, R.F., 4
- Wyoming Co., Buried Valley: Crosby, I.B., 1

GLACIAL LAKES, *see also* Glacial geology and Physiography
- Lake Arkona, Erie Co.: Leverett, F., 3
- Lake Arthur, Beaver-Lawrence Cos.: Preston, F.W., 1
- Lake Edmond
  - Beaver-Lawrence-Butler Cos.: Preston, F.W., 1; Shepps, V.C., 3, 4
- Lake Erie, Erie Co.: Hough, J.L., 1; Leverett, F., 3
- Lake Lundy, Erie Co.: Leverett, F., 3
- Lake Maumee, Erie Co.: Leverett, F., 3
- Lake Ohio, Western Pennsylvania, popular: James, J.W., 1
- Lake Warren, Erie Co.: Fairchild, H.L., 2; Leverett, F., 3; Spencer, J.W.W., 1
- Lake Watts
  - Beaver-Lawrence-Butler Cos.: Preston, F.W., 1; Shepps, V.C., 3, 4
- Lake Wayne, Erie Co.: Leverett, F., 3
- Lake Whittlesey, Erie Co.: Fairchild, H.L., 2; Leverett, F., 3
- Northwestern Pennsylvania: Hough, J.L., 2; Taylor, F.B., 1

GLASS SAND, *see also* Mineral resources and Sand
  Pennsylvania: Ferm, J.C., 1

GNEISS, *see also* Metamorphic rocks
  Bucks Co., Pochuck Gneiss: Buckwalter, T.V., Jr., 1
  Delaware Co., Precambrian: Ward, R.F., 1
  Lancaster Co., Pochuck Gneiss: Buckwalter, T.V., Jr., 1
  Lebanon Co., Pochuck Gneiss: Buckwalter, T.V., Jr., 1
  Philadelphia Co., Precambrian: Ward, R.F., 1

GOLD, *see also* Mineral resources
  Bucks Co.: Gault, H.R., 5

GRAHAMITE
  Washington Co.: Koppe, E.F., 2

GRANITIZATION
  Philadelphia Co., Wissahickon Schist: Ch'ih, C.S., 1

GRANODIORITE, *see also* Igneous rocks
  Philadelphia Co.: Postel, A.W., 1

GRAPHITE, *see also* Mineral resources
  Chester Co.: Sanford, R.S., 1

GRAVEL, *see also* Mineral resources
  Bucks Co.: Gault, H.R., 5; Ward, F., 1
  Cambria Co., New Florence Quad.: Shaffner, M.N., 5
  Indiana Co., New Florence Quad.: Shaffner, M.N., 5
  Lycoming Co., statistical studies: Griffiths, J.C., 9
  Northwestern Pennsylvania: Shepps, V.C., 3
  Somerset Co., New Florence Quad.: Shaffner, M.N., 5
  Southeastern Pennsylvania
    geomorphic value: Campbell, M.R., 9
    Stockton Formation: Dellwig, L.F., 1
  Westmoreland Co., New Florence Quad.: Shaffner, M.N., 5

GRAYWACKE, *see also* Sedimentary rocks
  Pennsylvania, petrography: Krynine, P.D., 2

GREENE COUNTY, *see also* Pennsylvania, Pennsylvania-Southwestern, and Pennsylvania-Western
  Economic geology
    coal, bituminous, reserves, Wallace, J.J., 3
  Geophysical investigations
    seismic station: Schroyer, J.B., 1
  Historical geology
    Pennsylvanian-Permian: Cross, A.T., 1; Sherrill, R.E., 1
    Permian: Arkle, T., Jr., 1; Cross, A.T., 6; Hennen, R.V., 1
  Paleontology
    Amphibia, Permian: Romer, A.S., 3; Vaughan, P.P., 1
    Mammalia
      mammoth, Pleistocene: Wells, D., 1
      mastodon, Pleistocene: Wells, D., 3
    plants, Permian: Cross, A.T., 6

GROUNDWATER
  Adams Co., springs: Scherer, P., 1
  Allegheny Co.
    Pittsburgh area: Noecker, M., 1; Van Tuyl, D.W., 1, 2
      popular: Van Tuyl, D.W., 4
    springs: Haywood, J.K., 1
  Beaver Co.: Van Tuyl, D.W., 3
  Bedford Co., springs: Haywood, J.K., 1
  Berks Co., relation to bedrock: O'Brien, G.D., 2
  Bucks Co.: Barksdale, H.C., 1; Bock, W., 1; Greenman, D.W., 1; Woolman, L., 1
    springs: Normandie, J., 1
  Cambria Co., New Florence Quad.: Shaffner, M.N., 5
  Central Pennsylvania, springs: Turner, T.D., 4
  Chester Co.: Barksdale, H.C., 1
  Dauphin Co.
    Hershey Valley: Foose, R.M., 2, 3
    relation to lithology: Foose, R.M., 1
  Delaware Co.: Barksdale, H.C., 1
  Erie Co., Lake Erie shore area: Mangan, J.W., 2
  Indiana Co., New Florence Quad.: Shaffner, M.N., 5
  Lebanon Co., Hershey Valley: Foose, R.M., 4
  Lycoming Co., springs: Haas, J., 2
  Montgomery Co.: Barksdale, H.C., 1; Bock, W., 8
    Lansdale area: Rima, D.R., 1
  Northampton Co.: Woolman, L., 1
  Northwestern Pennsylvania: Shepps, V.C., 3
  Pennsylvania: Dort, W., Jr., 3; Graham, J.B., 3; Lohman, S.W., 1; Lytle, W.S., 11; Meinzer, O.E., 1, 3
    levels: Graham, J.B., 1; Sundstrom, R.W., 1
    problems: Cathcart, S.H., 4
    springs: Bell, J., 1; Crook, J.K., 1; Mangan, J.W., 1
  Philadelphia Co.: Barksdale, H.C., 1
    Philadelphia area: Graham, J.B., 2

Potter Co., ice cave: Andrews, M.O., 1
Somerset Co., New Florence Quad.: Shaffner, M.N., 5
Southeastern Pennsylvania, temperature-movement relations: Foose, R.M., 3
Southwestern Pennsylvaina, Ohio River Basin: Meinzer, O.E., 2
Washington Co., analysis: Clarke, F.W., 7
Western Pennsylvania, analysis: Mills, R. van A., 1
Westmoreland Co.: Kidwell, C.H., 1
  New Florence Quad.: Shaffner, M.N., 5

GUIDEBOOKS
Allegheny Co., engineering geology: Philbrick, S.S., 3
Beaver Co., engineering geology: Philbrick, S.S., 3
Beaver-Lawrence Cos., glacial features: Preston, F.W., 1
Blair Co., Paleozoic rocks: Swartz, F.M., 8
Bucks Co.
  Triassic terrain: Johnson, M.E., 5; Lafayette College, 3
  Precambrian-Cambrian rocks: Anonymous, 42
Butler Co., Penn-Dixie limestone mine: Lytle, W.S., 10
Butler-Venango Cos., Devonian-Pennsylvanian: Lytle, W.S., 10
Carbon Co., Panther Creek Coal Basin: Lafayette College, 2
Central Pennsylvania: Arndt, H.H., 1
  clay deposits: Griffiths, J.C., 8
  Ordovician-Mississippian rocks: Swartz, F.M., 5
  Paleozoic rocks: Conlin, R.R., 1; Willard, B., 17
Centre Co., Cambrian-Ordovician rocks: Swartz, F.M., 6
Chester-Delaware Cos., Precambrian-Cambrian rocks: Watson, E.H., 1
Chester-Philadelphia Cos., crystalline rocks: Watson, E.H., 2
Clearfield Co., Pennsylvanian rocks: Nickelsen, R.P., 1
Crawford-Erie Cos., glacial geology: Shepps, V.C., 2
Eastern Pennsylvania
  Paleozoic rocks: Johnson, M.E., 4
  Philadelphia-Pottsville: Bowen, E., 1
Greene Co.: Arkle, T., Jr., 1
  Pennsylvanian-Permian rocks: Cross, A.T., 1
Greene-Washington Cos., Chestnut Ridge Anticline: Sherrill, R.E., 1
Jefferson Co., Paleozoic rocks: Swartz, F.M., 8
Lebanon Co.
  Cambrian-Ordovician rocks: Gray, C., 5
  Cornwall Iron Mine. Gray, C., 8
  Martinsburg Formation: Moseley, J.R., 5
Lehigh Co., slate and cement: Lafayette College, 1
Northampton Co.
  Lehigh River area: Lafayette College, 2
  slate and cement: Lafayette College, 1
Northeastern Pennsylvania: Arndt, H.H., 1
Northwestern Pennsylvania, Devonian-Pennsylvanian rocks: Lytle, W.S., 13
Pennsylvania, Pittsburgh-New York: Pittsburgh Geol. Soc., 1
Schuylkill Co., Panther Creek Coal Basin: Lafayette College, 2
Southeastern Pennsylvania, Cambrian-Ordovician rocks: Geyer, A.R., 2
Washington Co.: Arkle, T., Jr., 1
  Pennsylvanian-Permian rocks: Cross, A.T., 1
Western Pennsylvania, Pennsylvanian rocks: Dutcher, R.R., 1

GYPSUM, *see also* Mineral resources
Pennsylvania: White, W.B., 3

HALLITE, *see also* Mineralogy
Chester Co.: Clarke, F.W., 3

HEAVY MINERALS
Allegheny Co., Connellsville Sandstone: Demshar, L.S., 1
Philadelphia Co.: Genth, F.A., 5
Southeastern Pennsylvania, Lower Cretaceous: McCollum, J., 1

HELIUM
Western Pennsylvania, natural gas: Anderson, C.C., 1; Boone, W.J., Jr., 1

HISTORY
Chromite mining, Southeastern Pennsylvania: Pearre, N.C., 2
coal
  Luzerne Co.: Anonymous, 1
  Pennsylvania: Eavanson, H.N., 2; Robinson, C.W., 1
Cyrus Angell: Lytle, W.S., 8
J.F. Carll: Brewer, C., Jr., 1
Pennsylvania geological map: Willard, B., 4
Pennsylvania geology: Merrill, G.P., 1

petroleum: Bonine, C.A., 1; Croneis, C.G., 1; Dickey, P.A., 2, 3; Giddens, P.H., 1; Murray, D., 2
  anticlinal theory: Howell, J.V., 1; Rogers, H.D., 1; White, I.C., 7
  industry: White, C.D., 6
  origin: Campbell, M.R., 3
physiography, Pennsylvania: White, G.W., 1
R.D. Lacoe collection: Goode, G.B., 1

HORNBLENDE, *see also* Mineralogy
Chester-Philadelphia Cos.: Rosenzweig, A., 1

HORNFELS, *see also* Metamorphic rocks
Bucks Co., Triassic: Montgomery, A., 5

HUNTINGDON COUNTY, *sec also* Pennsylvania and Pennsylvania-Central
Areal geology
  Allensville Quad.: Wilson, P.C., 1
Economic geology
  coal, bituminous: Roberts, W.F., 4; Shepherd, F., 1
  cobalt: Boyé,, M.H., 1
  iron: Roberts, W.F., 4; Shepherd F., 1
  limestone: Roberts, W.F., 4
  manganese: Hoffman, J.N., 1
  radioactive minerals: Klemic, H., 3
  uranium: McCauley, J.F., 1
Engineering geology
  Hollidaysburg Quad.: U. S. Geol. Survey Engineering Geology and Ground Water Branches, 1
Geochemical investigations
  bitumen, Devonian: Swain, F.M., Jr., 3
Historical geology
  Devonian, Orbisonia Quad.: Dobbins, D.A., 1
  Silurian-Devonian, Allensville Quad.: Dort, W., Jr., 5
Maps
  geologic, Allensville Quad.: Dort, W., Jr., 5
Paleontology
  Brachiopoda, Ordovician: Ulrich, E.O., 5
  Ostracoda, Ordovician: Swain, F.M., Jr., 2
  Pteropoda, Devonian: Hall, J., 12
  Trilobita, Devonian: Delo, D.M., 1
Physical geology
  thrust faulting, Sinking Valley area: Moebs, N.W., 1
Physiographic geology
  caves
    Bear Den Cave: Turner, T.D., 2
    Graysville Cave: Hassemer, G., 3
    Hesston Cave: Barger, J., 1
    Kooken's Cave: Anonymous, 33, 45; DeVitt, W., 3d, 1; Edwards, J., 2
    McConnellstown Quarry Cave: Edwards, J., 1, 3; White, W.B., 1
    Petersburg Cave: Ifft, J., 1
    Wellers Cave: Barger, J., 2

HYDROMAGNESITE, *see also* Mineralogy
Lancaster Co.: Dana, J.D., 2

HYPERSTHENE, *see also* Mineralogy
Delaware Co.: Clavan, W., 1

IGNEOUS ROCKS, *see also* individual types
Chester Co.: Bascom, F., 1; Waraksa, I.R., 1
  Honeybrook-Phoenixville Quads.: Postel, A.W., 2
Delaware Co.
  enstatite rock: Tomlinson, W.H., 3
  Springfield Quarry: Berman, J., 1
Lancaster Co.: Bascom, F., 1
Lebanon Co., Ordovician: Moseley, J.R., 5
Southeastern Pennsylvania
  analysis: Washington, H.S., 2
  granophyre: Hotz, P.E., 2
Philadelphia Co., age: Postel, A.W., 3
York Co., granophyre: Hotz, P.E., 4

INDIANA COUNTY, *see also* Pennsylvania and Pennsylvania-Western
Areal geology
  New Florence Quad.: Shaffner, M.N., 1, 5
Economic geology
  clay, New Florence Quad.: Shaffner, M.N., 1, 5
  coal, bituminous: Foster, W.B., 1
    analysis: Fieldner, A.C., 4
    New Florence Quad.: Shaffner, M.N., 1, 3, 4, 5
    reserves: Dowd, J.J., 2
  fire clay: Hopkins, T.C., 3
  iron, New Florence Quad.: Shaffner, M.N., 1, 5
  limestone, New Florence Quad.: Shaffner, M.N., 1, 5
  natural gas, New Florence Quad.: Shaffner, M.N., 1, 5
  sand and gravel, New Florence Quad.: Shaffner, M.N., 5
  sandstone, New Florence Quad.: Shaffner, M.N., 1, 5
Geophysical investigations
  gamma ray log, Mississippian Sandstones, Elders Ridge Quad: Payne, F.R., Jr., 1
Ground water
  New Florence Quad.: Shaffner, M.N., 5

- *Historical geology*
  - Devonian-Pennsylvanian, New Florence Quad.: Shaffner, M.N., 1
  - Devonian-Pleistocene, New Florence Quad.: Shaffner, M.N., 5
- *Maps*
  - economic
    - coal, bituminous: Dowd, J.J., 2
    - New Florence Quad.
      - Brookville coal: Shaffner, M.N., 5
      - Lower Freeport Coal: Shaffner, M.N., 5
      - Lower Kittanning Coal: Shaffner, M.N., 5
    - mineral resources: Shaffner, M.N., 5
    - Rider Coal: Shaffner, M.N., 5
    - Upper Freeport Coals: Shaffner, M.N., 5
    - Upper Kittanning Coal: Shaffner, M.N., 5
  - geologic, New Florence Quad.: Shaffner, M.N., 1, 5
  - structure contour, New Florence Quad., Lower Kittanning Coal: Shaffner, M.N., 1
- *Mineralogy*
  - epsomite: Boyé, M.H., 2
- *Paleontology*
  - Insecta, Pennsylvanian: Handlirsch, A., 1
  - plants, Pennsylvanian: Harlan, R., 5
- *Physiographic geology*
  - Strangford Cave: Risler, G., 1

INDIANITE, *see also* Mineralogy
- Chester-Lancaster Cos.: Silliman, B., Jr., 1

INDUSTRIAL MINERALS, *see also* Mineral resources
- Pennsylvania, 1951: Stephenson, R.C., 2

INSECTA, *see also* Arthropoda
- cockroaches, Luzerne Co., Pennsylvanian: Scudder, S.H., 1, 2
- Pennsylvania, Pennsylvanian: Handlirsch, A., 1

INSOLUBLE RESIDUES
- Allentown Formation, Northampton Co.: Engman, H.A., 1
- Conococheague Limestone, Berks Co.: Latshaw, W.L., 1
- Huntsville Limestone, Southcentral Pennsylvania: Messineo, A.V., 1
- Stones River Limestone, Southcentral Pennsylvania: Messineo, A.V., 1

INVERTEBRATA, *see also* individual types
- Bucks Co., Triassic: McLaughlin, D.B., 6
- Central Pennsylvania, Cambrian: Tasch, P., 4
- Eastern Pennsylvania, Lower Paleozoic: Sharpe, D., 1
- Pennsylvania
  - Devonian: Swartz, F.M., 10
    - type specimens: Wagner Free Inst. Science, 1
  - Paleozoic: Grabau, A.W., 1; Shimer, H.W., 4
  - Silurian: Swartz, F.M., 11
- York Co., Triassic: Wanner, H.E., 1

IRON, *see also* iron-bearing minerals and Mineral resources
- Adams Co., Carlisle Quad.: Stose, G.W., 4
- Bedford Co.: Roberts, W.F., 4; Shepherd, F., 1
- Berks Co.: Hawkes, H.E., Jr., 1, 2
- Bradford Co.: Lesley, J.P., 1
- Bucks Co.: Gault, H.R., 5
- Cameron Co.: Dickeson, M.W., 4; Warren, G., 1
- Cambria Co., New Florence Quad: Shaffner, M.N., 1, 5
- Clearfield Co.: Hotchkiss, J., 1; Johnson, W.R., 1
- Cumberland Co., Carlisle Quad.: Stose, G.W., 4
- Dauphin Co.: Hall, J., 1; Taylor, R.C., 2
- Elk Co.: Dalson, A.F., 1; Jackson, C.T., 1; Northwestern Pennsylvania Oil and Coal Co., 1
- Fayette Co.: Lyman, B.S., 1; Stewart, D.S., 1
- Huntingdon Co.: Roberts, W.F., 4; Shepherd, F., 1
- Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
- Juniata Co.: Tyson, P.T., 1
- Lancaster Co.: Frazer, P., Jr., 3
- Lebanon Co.: Carr, M.E.S., 1; Geyer, A.R., 2; Gray, C., 8, 13; Hickok, W.O., 4th, 1; Mikami, H.M., 1; Taylor, R.C., 2
  - Lebanon Quad.: Geyer, A.R., 3
  - Richland Quad.: Gray, C., 12
- Luzerne Co.: Roberts, W.F., 1, 14
- Lycoming Co.: Anonymous, 2; Dickeson, M.W., 3; Hodge, J.T., 1; Lycoming Coal Co., 1; Ralston Coal Estate, 1; Shuttleworth, J., 1
- McKean Co.: Colton, I.C., 1; Dalson, A.F., 1; Needham, B., 1; Owen, D.D., 1; Sheafer, P.W., 1
- Pennsylvania: Bell, I.L., 1, 2; Eckel, E.C., 2; Einecke, G., 1; Hopkins, T.C., 4; Pumpelly, R., 1; Wetherill, C.M., 1

- Perry Co.: Swartz, F.M., 12
- Schuylkill Co.: Hall, J., 1; Roberts, W.F., 1, 14
- Snyder Co.: Earle, R.B., 1
- Somerset Co.: Ferguson, J.H., 1; Union Coal Co., 1; Wolff, G.D., 1
  - New Florence Quad.: Shaffner, M.N., 1, 5
- Southeastern Pennsylvania: Jensen, H., 1
  - Blue Ridge area: Foose, R.M., 5
- Tioga Co.: Hughes, G.W., 1; Taylor, R.C., 1
- Union Co.: Earle, R.B., 1
- Westmoreland Co., New Florence Quad.: Shaffner, M.N., 1, 5
- York Co.: Frazer, P., Jr., 3; Hotz, P.E., 1
  - Carlisle Quad.: Stose, G.W., 4

JAROSITE, *see also* Mineralogy
- Allegheny-Somerset Cos.: Warshaw, C.M., 1

JEFFERISITE, *see also* Mineralogy
- Chester Co.: Clarke, F.W., 2

JEFFERSON COUNTY, *see also* Pennsylvania and Pennsylvania-Western
- *Economic geology*
  - coal, bituminous, reserves: Dowd, J.J., 6
  - radioactive minerals: Ferm, J.C., 2
- *Historical geology*
  - Devonian-Pennsylvanian: Swartz, F.M., 8
  - Pennsylvanian, Kittanning Formation: Ferm, J.C., 4
- *Maps*
  - economic, coal, bituminous: Dowd, J.J., 6
- *Petrology*
  - Kittanning Formation: Ferm, J.C., 4

JOINTS, *see also* Structural geology
- Clearfield Co., photogeology: Lattman, L.H., 1
- Dauphin Co.: Sheppard, R.A., 1
- Fayette Co.: Smith, L.B., 1
- Lebanon Co.: Sheppard, R.A., 1
- Pennsylvania: Heck, E.T., 1
- Southwestern Pennsylvania: Hough, van N.D., 1
- Western Pennsylvania: Nickelsen, R.P., 3
  - in coal: Moore, E.S., 1

JUNIATA COUNTY, *see also* Pennsylvania and Pennsylvania-Central
- *Economic geology*
  - iron: Tyson, P.T., 1
- *Paleontology*
  - Ostracoda, Silurian: Hoskins, D.M., 1; Swartz, C.K., 5

JURASSIC PERIOD, *see also* Mesozoic Era
- Eastern Pennsylvania: Thom, W.T., Jr., 1

KAMMERERITE, *see also* Mineralogy
- Lancaster Co.: Garrett, T.H., 1

KAOLIN, *see also* Clay and Mineral resources
- Chester Co.: Spencer, A.C., 1

KYANITE, *see also* Mineralogy
- Chester Co.: Silliman, B., Jr., 1
- Delaware Co.: Dike, P.A., 2

LACKAWANNA COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern
- *Economic geology*
  - coal, anthracite: Roberts, W.F., 6; Silliman, B., Sr., 1
- *Paleontology*
  - Insecta, Pennsylvanian: Handlirsch, A., 1
  - plants, Pennsylvanian: Fairchild, H.L., 1

LANCASTER COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
- *Areal geology*
  - Richland Quad.: Gray, C., 12
- *Economic geology*
  - chromium: Dieffenbach, O., 1; Fisher, L.W., 1; Lapham, D.M., 1; Luft, S.J., 1; Pearre, N.C., 2
  - iron ore: Frazer, P., Jr., 3
  - nickel: Barlow, A.E., 1; Campbell, W., 1, 2: Dickeson, M.W., 1
    - geobotanical evidence: Good, R.S., 1
  - petroleum: Bibbins, A.B., 1
  - quartzite: Strueve, H., 1
- *Geophysical investigations*
  - aeromagnetic
    - Conestoga Quad.: Socolow, A.A., 3
    - Morgantown Quad.: Socolow, A.A., 9
    - Quarryville Quad.: Socolow, A.A., 14
    - Safe Harbor Quad.: Socolow, A.A., 15
  - dip needle traverse: Randall, J.A., 1
- *Historical geology*
  - Ordovician: Cramer, H.R., 1; Wise, D.U., 1
  - Precambrian: Bascom, F., 1
  - Triassic: McLaughlin, D.B., 2, 4, 5
    - Richland Quad.: Gray, C., 12

- *Maps*
  - aeromagnetic
    - Conestoga Quad.: Bromery, R.W., 3
    - Morgantown Quad.: Bromery, R.W., 10
    - Quarryville Quad.: Bromery, R.W., 15
    - Safe Harbor Quad.: Bromery, R.W., 16
  - geologic, Richland Quad.: Gray, C., 12
- *Mineralogy*
  - anorthite: Silliman, B., Jr., 1
  - antigorite: Glass, J.J., 1
  - bronzite: Garrett, T.H., 1
  - brucite: Brindley, G.W., 1; Brush, G.J., 1; Dana, J.D., 1
  - chloritoid: Hietanen, A.M., 1
  - chromium minerals, popular: Duersmith, L.J., 1
  - dolomite: Garrett, T.H., 1
  - emerald nickel: Garrett, T.H., 1
  - hydromagnesite: Dana, J.D., 2
  - indianite: Silliman, B., Jr., 1
  - kammererite: Garrett, T.H., 1
  - lancasterite: Dana, J.D., 2
  - limonite pseudomorphs: Anonymous, 25
  - magnetite: Lapham, D.M., 3
  - millerite: Genth, F.A., 3
  - nickellite: Blake, W. P., 1
  - serpentine: Genth, F.A., 4
- *Paleontology*
  - Crustacea, Cambrian: Resser, C.E., 2
  - Reptilia, Triassic: Price, J.W., Sr., 1
  - Trilobita, Cambrian: Walcott, C.D., 5, 6
- *Petrology*
  - Antietam Schist, contact metamorphism: Chapman, R.W., 1
  - Igneous rocks: Bascom, F., 1
  - metamorphic rocks: Bascom, F., 1
  - Peach Bottom Slate: Agron, S.L., 2
  - pegmatite: Tomlinson, W.H., 2
  - Pochuck Gneiss: Buckwalter, T.V., Jr., 1
  - Port Deposit Granodiorite: Cloos, E., 1
  - Schist assimilation by diabase: Tomlinson, W.H., 1
  - Vintage Dolomite, contact metamorphism: Chapman, R.W., 1
- *Physical geology*
  - cleavage: Cloos, E., 1
  - deformation, Peach Bottom Syncline: Agron, S.L., 1, 2
  - flow folding, Ordovician: Wise, D.U., 2
  - potholes, Susquehanna River: Myers, R.E., 2

LANCASTERITE, *see also* Mineralogy
- Lancaster Co.: Dana, J.D., 2

LANDSLIDES
- Allegheny Co.: Ackenheil, A.C., 1

LAWRENCE COUNTY, *see also* Pennsylvania and Pennsylvania-Western
- *Historical geology*
  - Pennsylvanian: Weis, G.F., 1
- *Maps*
  - economic, limestone: Ames, J.A., 2
- *Mineralogy*
  - clay minerals: Droste, J.B., 2
- *Petrology*
  - glacial till: Sitler, R.F., 1
- *Physiographic geology*
  - Beaver River Gorge: Wright, G.F., 1
  - caves: White, W.B., 2
  - glacial features: Preston, F.W., 1

LEAD, *see also* lead-bearing minerals and Mineral resources
- Bucks Co.: Dickeson, M.W., 2; Earl, K.M., 2; Gault, H.R., 5
- Chester Co.: Genth, F.A., 1
- Columbia Co.: Earl, K.M., 1

LEBANON COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
- *Areal geology*
  - Lebanon Quad.: Geyer, A.R., 3
  - Richland Quad.: Gray, C., 12
- *Economic geology*
  - clay: Taylor, R.C., 2
  - coal, anthracite: Baird, T., 2; Roberts, W.F., 2; Strong, H.K., 1; Taylor, R.C., 2
  - fire clay: Taylor, R.C., 2
  - iron: Carr, M.E.S., 1; Geyer, A.R., 2; Gray, C., 8, 13; Hickok, W.O., 4th, 1; Mikami, H.M., 1; Taylor, R.C., 2
    - Lebanon Quad.: Geyer, A.R., 3
    - Richland Quad.: Gray, C., 12
  - limestone: Gray, C., 3, 13
    - Lebanon Quad.: Geyer, A.R., 3
    - Richland Quad.: Gray, C., 12
- *Ground water*
  - Hershey Valley: Foose, R.M., 4
- *Historical geology*
  - Cambrian-Ordovician: Gray, C., 5
  - Cambrian-Triassic
    - Cornwall area: Gray, C., 8
    - Lebanon Quad.: Geyer, A.R., 3
    - Richland Quad.: Gray, C., 12
  - Ordovician: Svetlich, W.G., 1
    - Igneous rocks: Urry, W.D., 1
    - Martinsburg Formation: Moseley, J.R., 3, 5
  - Precambrian-Ordovician: Gray, C., 7
  - Triassic: McLaughlin, D.B., 2, 4, 5

- *Maps*
  - economic
    - Annville Limestone: Gray, C., 3
    - coal, anthracite: Baird, T., 2; Taylor, R.C., 2
  - geologic
    - Lebanon Quad.: Geyer, A.R., 3
    - Richland Quad.: Gray, C., 12
- *Mineralogy*
  - pyrite: Travis, C., 1
- *Paleontology*
  - Bryozoa, Devonian: McNair, A.H., 1
  - Eurypterida, Silurian: O'Connell, M., 1
  - Stelleroidea, Ordovician: Cramer, H.R., 2
  - Trilobita, Ordovician: Whittington, H.B., 1
- *Petrology*
  - basalt: Moseley, J.R., 6
  - diabase: Edie, R.W., 1; Gray, C. 10
  - diorite: Moseley, J.R., 6
  - igneous rock, Ordovician: Moseley, J.R., 5; Urry, W.D., 1
  - Pochuck Gneiss: Buckwalter, T.V., Jr., 1
- *Physical geology*
  - faults, Martinsburg Formation: Moseley, J.R., 4
  - joints: Sheppard, R.A., 1
  - recumbent folds: Gray, C., 6
  - stylolites: Prouty, C.E., 2
- *Physiographic geology*
  - cave, Swatara Creek: Miller, P., 1

LEHIGH COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern

- *Economic geology*
  - cement: Lafayette College, 1
  - slate: Gray, C., 13; Lafayette College, 1
  - zinc: Childs, M.S., 1; Gray, C., 13; Hay, R.B., 1
- *Geophysical investigations*
  - aeromagnetic
    - Allentown Quad.: Socolow, A.A., 1
    - East Greenville Quad.: Socolow, A.A., 4
    - Milford Square Quad.: Socolow, A.A., 8
  - electrical resistivity, Lehigh Tunnel: Scharon, H.L., 2
  - x-ray diffraction, slate: Anderson, H.V., 1
- *Historical geology*
  - Ordovician: Stose, G.W., 3
- *Maps*
  - aeromagnetic
    - Allentown Quad.: Bromery, R.W., 1
    - East Greenville Quad.: Bromery, R.W., 4
    - Milford Square Quad.: Bromery, R.W., 9
- *Paleontology*
  - Brachiopoda, Ordovician: Ulrich, E.O., 5
  - Nautiloidea
    - Cambrian: Ulrich, E.O., 7
    - Ordovician: Ulrich, E.O., 3
  - Reptilia, Triassic: Emmons, E., 1; Huene, F. von, 1; McGregor, J.H., 1
  - worm, Cambrian: Lyman, B.S., 5
- *Petrology*
  - pinite schist: Virgin, W.W., Jr., 2
- *Physical geology*
  - earthquake: Heck, N.H., 2; Murphy, L.M., 1

LIGNITE

- Franklin Co.: Lesley, J.P., 7

LIMESTONE, *see also* Mineral resources

- Allegheny Co.: Antisell, T., 1
- Bedford Co.: Roberts, W.F., 4
- Berks Co.: Gray, C., 2, 3
- Bucks Co.: Gault, H.R., 5
- Butler Co.: Lytle, W.S., 10
- Cambria Co., New Florence Quad.: Shaffner, M.N., 1, 5
- Clearfield Co.: Hotchkiss, J., 1; Johnson, W.R., 1
- Cumberland Co., analysis: Clarke, F.W., 4
- Elk Co.: Jackson, C.T., 1
- Fayette Co.: Grasty, J.S., 1; Lesley, J.P., 8; Lyman, B.S., 1
  - Donegal Quad.: Shaffner, M.N., 2
- Franklin Co.: Swartz, F.M., 9
- Huntingdon Co.: Roberts, W.F., 4
- Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
- Lebanon Co.: Gray, C., 3, 13
  - Lebanon Quad.: Geyer, A.R., 3
  - Richland Quad.: Gray, C., 12
- Luzerne Co.: Roberts, W.F., 14
- Lycoming Co.: Lycoming Coal Co., 1; Ralston Coal Estate, 1
- McKean Co.: Colton, I.C., 1; Needham, B., 1; Sheafer, P.W., 1
- Pennsylvania: Stone, R.W., 5; Wetherill, C.M., 1
- Schuylkill Co.: Roberts, W.F., 14
- Somerset Co.: Ferguson, J.H., 1; Union Coal Co., 1; Wolff, G.D., 1
  - Donegal Quad.: Shaffner, M.N., 2
  - Meyersdale Quad.: Flint, N.K., 1
  - New Florence Quad.: Shaffner, M.N., 1, 5
  - southern: Flint, N.K., 2
- Southeastern Pennsylvania: Prouty, C.E., 7

- Jacksonburg Formation: Warmkassel, C.A., 1
- Southwestern Pennsylvania: Ames, J.A., 2
- Tioga Co.: Taylor, R. C., 1
- Washington Co.: Lesley, J.P., 5
- Westmoreland Co.: Antisell, T., 1; Grasty, J.S., 1
  - Donegal Quad.: Shaffner, M.N., 2
  - New Florence Quad.: Shaffner, M.N., 1, 5

LIMONITE, *see also* Mineral resources and Mineralogy
- Pennsylvania: White, W.B., 3

LOESS
- Susquehanna River Valley: Higbee, H.W., 1; Millette, J.F.G., 1

LUZERNE COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern
- *Economic geology*
  - coal, anthracite: Anonymous, 1; Jones, E., 1, 2; Roberts, W.F., 1, 3, 5, 7, 11, 14, 16
  - iron: Roberts, W.F., 1, 14
  - limestone: Roberts, W.F., 14
  - petroleum: Roberts, W.F., 15
  - radioactive minerals: Klemic, H., 3
- *Historical geology*
  - Devonian: Roberts, W.F., 15
  - Pennsylvanian: Powell, W.B., 1
- *Maps*
  - physiographic, Susquehanna Valley fill: Ash, S.H., 1
- *Paleontology*
  - Branchiopoda, Pennsylvanian: Packard, A.S., Jr., 1
  - Insecta, Pennsylvanian: Handlirsch, A., 1
    - cockroach, Pennsylvanian: Scudder, S.H., 1, 2
  - Mill Creek Limestone fauna, Pennsylvanian: Chow, M.M., 1
  - plants, Pennsylvanian: Fairchild, H.L., 1
- *Physical geology*
  - earthquakes: Murphy, L.M., 2
- *Physiographic geology*
  - glacial valley: Ash., S.H., 1

LYCOMING COUNTY, *see also* Pennsylvania and Pennsylvania-Central
- meteorites: Farrington, O.C., 3
- *Economic geology*
  - coal, bituminous: Anonymous, 2; Dickeson, M.W., 3; Hodge, J.T., 1; Lycoming Coal Co., 1; Ralston Coal Estate, 1; Shuttleworth, J., 1
  - fire clay: Hodge, J.T., 1; Ralston Coal Estate, 1
  - iron: Anonymous, 2; Dickeson, M.W., 3; Hodge, J.T., 1; Lycoming Coal Co., 1; Ralston Coal Estate, 1; Shuttleworth, J., 1
  - limestone: Lycoming Coal Co., 1; Ralston Coal Estate, 1
  - salt: Anonymous, 2; Lycoming Coal Co., 1
  - stone: Hodge, J.T., 1
- *Ground water*
  - springs: Haas, J., 2
- *Historical geology*
  - Devonian-Pennsylvanian: Ebright, J.R., 4
- *Maps*
  - economic, natural gas: Ebright, J.R., 4
  - structure, Hyner-Ferney area: Ebright, J.R., 4
- *Paleontology*
  - Reedsville Shale, Ordovician: Gross, C.M., 1
- *Petrology*
  - coal, bituminous, analysis: Rogers, H.D., 1
  - gravel parameters: Griffiths, J.C., 9

McKEAN COUNTY, *see also* Pennsylvania, Pennsylvania-Northern, and Pennsylvania-Western
- *Economic geology*
  - clay: Colton, I.C., 1
  - coal
    - bituminous: Colton, I.C., 1; Dalson, A.F., 1, 2; Hall, J., 4; Needham, B., 1; Owen, D.D., 1; Sheafer, P.W., 1
    - cannel: Colton, I.C., 1
  - fire clay: Needham, B., 1; Sheafer, P.W., 1
  - iron: Colton, I.C., 1; Dalson, A.F., 1; Needham, B., 1; Owen, D.D., 1; Sheafer, P.W., 1
  - limestone: Colton, I.C., 1; Needham, B., 1; Sheafer, P.W., 1
  - natural gas
    - Bradford Quad.: Fettke, C.R., 39
    - Smethport Quad.: Seifert, W.H., 1
  - petroleum: Feldman, J., 1
    - Bradford Oil Field: Buckwalter, J.F., 1; Fettke, C.R., 49
    - Bradford Quad.: Fettke, C.R., 39
    - Smethport Quad.: Seifert, W.H., 1
- *Geophysical investigations*
  - electrical logging, Bradford Oil Field: Gillingham, W.J., 1
  - electrical resistivity, porosity: Howell, B.F., Jr., 1

- *Historical geology*
  - Devonian: Fettke, C.R., 16, 17, 18; Russell, E.L., Jr., 1
    - Bradford Oil Field: Fettke, C.R., 49
    - Bradford Quad.: Fettke, C.R., 39
    - Smethport Quad.: Seifert, W.H., 1
  - Devonian-Mississippian: Ashburner, C.A., 1
  - Devonian-Pennsylvanian: Fettke, C.R., 26
  - Ordovician-Devonian: Hoffacker, B.L., Jr., 1; Fettke, C.R., 32
  - Pennsylvanian: Owen, D.D., 1
  - Silurian-Devonian: Fettke, C.R., 7, 9, 22, 27, 30
- *Maps*
  - economic
    - coal, bituminous: Dalson, A.F., 1
    - petroleum and gas: Fettke, C.R., 39
      - Smethport Quad.: Seifert, W.H., 1
  - structure contour
    - Bradford Quad., Bradford Sandstone: Fettke, C.R., 39
    - Smethport Quad., Bradford Third Sand: Seifert, W.H., 1
- *Paleontology*
  - Brachiopoda, Mississippian: Hall, J., 21, 22
  - Devonian fauna, Bradford Oil Field: Metz, C.T., 1
  - Pelecypoda, Devonian: Hall, J., 15, 16, 17
  - plant, Devonian: Arnold, C.A., 2
- *Petrology*
  - porosity: Howell, B.F., Jr., 1
- *Physiographic geology*
  - relative relief: Chilcote, R.H., 1

MAGNETITE, *see also* Mineral resources and Mineralogy
- Lancaster Co.: Lapham, D.M., 3

MAMMALIA
- Blair Co., Pleistocene: Hall, E.R., 1
- buffalo, Bucks Co., Pleistocene: Rhoads, S.N., 1
- carnivores, Bedford Co., Pleistocene: Bender, M.S., 1
- Cumberland Co., Pleistocene: Rafinesque, C.S., 1
- elephants, Western Pennsylvania, Pleistocene: Harlan, R., 1
- mammoth, Greene Co., Pleistocene: Wells, D., 1
- mastodon, Greene Co., Pleistocene: Wells, D., 2
- Montgomery Co., Pleistocene: Hall, E.R., 1
- peccary, Bucks Co., Pleistocene: Mercer, H.C., 1
- Pennsylvania, Pleistocene: Hay, O.P., 2
- puma, Montgomery Co., Pleistocene: Simpson, G.G., 1
- rhinoceros, Somerset Co., Pleistocene: Featherstonhaugh, G.W., 1; Harlan, R., 2
- rodents, Montgomery Co., Pleistocene: Hibbard, C.W., 1, 2
- tapir, Montgomery Co., Pleistocene: Simpson, G.G., 2

MANGANESE, *see also* Mineral resources
- Adams Co., Carlisle Quad.: Stose, G.W., 4
- Central Pennsylvania: Hoffman, J.N., 1
- Cumberland Co., Carlisle Quad.: Stose, G.W., 4
- Pennsylvania: Chase, L.R., 1; Hoffman, J.N., 2
- York Co., Carlisle Quad.: Stose, G.W., 4

MAPS
- *Economic*
  - coal, Pennsylvania: Anonymous, 20
    - anthracite
      - Columbia Co.
        - Ashland Quad.: Haley, B.R., 1, 2
        - Mt. Carmel Quad.: Rothrock, H.E., 5
      - Dauphin Co.: Baird, T., 2; Taylor, R.C., 2
      - Lebanon Co.: Baird, T., 2; Taylor, R.C., 2
      - Northumberland Co., Mt. Carmel Quad.: Rothrock, H.E., 2, 4, 5
      - Schuylkill Co.: Baird, T., 1, 2, 3
        - Ashland Quad.: Haley, B.R., 1, 2
        - Delano Quad.: Maxwell, J.A., 1
        - Mt. Carmel Quad.: Rothrock, H.E., 5
        - Shenandoah Quad.: Danilchik, W., 1; Kehn, T.M., 1
    - bituminous
      - Armstrong Co.: Dowd, J.J., 3
      - Bradford Co.: Lesley, J.P., 1
      - Cambria Co.: Dowd, J.J., 1
        - New Florence Quad.: Shaffner, M.N., 5
      - Clearfield Co.: Blaylock, D.W., 1
      - Elk Co.: Dalson, A.F., 1
      - Fayette Co.: Dowd, J.J., 4
      - Indiana Co.: Dowd, J.J., 2
        - New Florence Quad.: Shaffner, M.N., 5
      - Jefferson Co.: Dowd, J.J., 6
      - McKean Co.: Dalson, A.F., 1
      - Somerset Co.: Ferguson, J.H., 1; Union Coal Co., 1; Wallace, J.J., 2

      - New Florence Quad.: Shaffner, M.N., 5
    - Southwestern Pennsylvania: Murphy, R.E., 1
      - Pittsburgh coal: Eavanson, H.N., 1
    - Venango Co.: Alford, N.G., 1
    - Western Pennsylvania: Deasy, G.F., 1, 2; Halberstadt, B., 1
    - Westmoreland Co.: Dowd, J.J., 5
      - New Florence Quad.: Shaffner, M.N., 5
  - corundum, Chester-Delaware Cos.: Pearre, N.C., 1
  - deep well locations, Western Pennsylvania: Everhart, G.M., 1
  - limestone
    - Armstrong Co.: Ames, J.A., 2
    - Beaver Co.: Ames, J.A., 2
    - Berks Co.: Gray, C., 2, 3
    - Butler Co.: Ames, J.A., 2
    - Lawrence Co.: Ames, J.A., 2
    - Lebanon Co.: Gray, C., 3
  - mineral resources
    - Cambria Co., New Florence Quad.: Shaffner, M.N., 1, 5
    - Fayette Co., Donegal Quad.: Shaffner, M.N., 2
    - Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
    - Pennsylvania: Evans, L., 3; Sheafer, P.W., 2; Wyer, S.S., 1
    - Somerset Co.
      - Donegal Quad.: Shaffner, M.N., 2
      - New Florence Quad.: Shaffner, M.N., 1, 5
      - southern: Flint, N.K., 2
    - Westmoreland Co.
      - Donegal Quad.: Shaffner, M.N., 2
      - New Florence Quad.: Shaffner, M.N., 1, 5
  - natural gas
    - Centre Co.: Ebright, J.R., 4
    - Clinton Co.: Ebright, J.R., 4
    - Lycoming Co.: Ebright, J.R., 4
  - petroleum
    - Northwestern Pennsylvania: Root, Anthony, and Co., 1
    - Western Pennsylvania: Smith, H.J., 1
  - petroleum and natural gas
    - Bradford Co.: Kreidler, W.L., 1
    - Butler Co., Butler Quad.: Lytle, W.S., 3
    - Forest Co., Sheffield Quad., Ingham, A.I., 3
    - McKean Co.
      - Bradford Quad.: Fettke, C.R., 39
      - Smethport Quad.: Seifert, W. H., 1
    - Northern Pennsylvania: Ingham, A.I., 1
    - Pennsylvania: Pa. Geol. Survey, 2
    - Potter Co.: Kreidler, W.L., 1
    - Susquehanna Co.: Kreidler, W.L., 1
    - Tioga Co.: Kreidler, W.L., 1
    - Warren Co., Sheffield Quad.: Ingham, A.I., 3
    - Western Pennsylvania: Coe, A.C., 1; Cohee, G.V., 1; Fettke, C.R., 55; Jones, T.H., 1
  - salt
    - Pennsylvania: Fettke, C.R., 54
    - Western Pennsylvania: Fettke, C.R., 52
  - uranium, Pennsylvania: Schnabel, R.W., 2

Geological

  - Adams Co., Carlisle Quad.: Stose, G.W., 4
  - Beaver Co.: Van Tuyl, D.W., 3
  - Berks Co., Boyertown Quad.: Buckwalter, T.V., Jr., 6
  - Bucks Co.: Barksdale, H.C., 1; Greenman, D.W., 1; Willard, B., 3
    - Buckingham Mountain: Wherry, E.T., 3
  - Cambria Co., New Florence Quad.: Shaffner, M.N., 1, 5
  - Cameron Co., Leidy Gas Field: Ebright, J.R., 2
  - Central Pennsylvania: Arndt, H.H., 1
  - Chester Co.: Barksdale, H.C., 1; Rogers, H.D., 3
  - Clinton Co., Leidy Gas Field: Ebright, J.R., 2
  - Crawford Co., Berea Sandstone, Mississippian: Pepper, J.F., 1
  - Cumberland Co., Carlisle Quad.: Stose, G.W., 4
  - Delaware Co.: Barksdale, H.C., 1
  - Fayette Co., Donegal Quad.: Shaffner, M.N., 2
  - Huntingdon Co., Allensville Quad.: Dort, W., Jr., 5
  - Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
  - Lancaster Co., Richland Quad.: Gray, C., 12
  - Lebanon Co.
    - Lebanon Quad.: Geyer, A.R., 3
    - Richland Quad.: Gray, C., 12
  - Montgomery Co.: Barksdale, H. C., 1
  - Northeastern Pennsylvania: Arndt, H.H., 1
  - Pennsylvania: Anonymous, 5; Beaujour, C.A.F., de, 1; Bradley, F.H., 1; Cleaveland, P., 1; Hitchcock, C.H., 1, 2; Hitchcock, E., 2; McGee, WJ, 1; Maclure, W., 1; Marcou, J., 1; Moxon, C., 1; Rogers, H.D., 6; Willis, B., 2
    - history: Willard, B., 4

index: Boardman, L., 1
Philadelphia Co.: Barksdale, H.C., 1
Potter Co., Leidy Gas Field: Ebright, J.R., 2
Schuylkill Co., Minersville-Tremont Quads.: Wood, G.H., Jr., 2
Somerset Co.
  Donegal Quad.: Shaffner, M.N., 2
  New Florence Quad.: Shaffner, M.N., 1, 5
  southern: Flint, N.K., 2
  Wellersburg area: Swartz, C.K., 3
Southeastern Pennsylvania: Frazer, P., Jr., 3
  Triassic: McKee, E.D.. 1
Western Pennsylvania, Mississippian Sandstones: Pepper, J.F., 1
Westmoreland Co.
  Donegal Quad.: Shaffner, M.N., 2
  New Florence Quad.: Shaffner, M.N., 1, 5
York Co., Carlisle Quad.: Stose, G.W., 4

Geophysical investigations
aeromagnetic
  Berks Co.
    East Greenville Quad.: Bromery, R.W., 4
    Elverson Quad.: Bromery, R.W., 5
    Morgantown Quad.: Bromery, R.W., 10
    Sassamansville Quad.: Bromery, R.W., 17
  Bucks Co.
    Allentown Quad.: Bromery, R.W., 1
    Buckingham Quad.: Bromery, R.W., 2
    Lambertville Quad.: Bromery, R.W., 6
    Malvern Quad.: Bromery, R.W., 7
    Milford Square Quad.: Bromery, R.W., 9
    Perkiomenville Quad.: Bromery, R.W., 12
    Quakertown Quad.: Bromery, R.W., 14
    Stockton Quad.: Bromery, R.W., 6
  Central Pennsylvania: Vacquier, V., 1
  Chester Co.
    Elverson Quad.: Bromery, R.W., 5
    Media Quad.: Bromery, R.W., 8
    Morgantown Quad.: Bromery, R.W., 10
    Norristown Quad.: Bromery, R.W., 11
    Phoenixville Quad.: Bromery, R.W., 13
    Valley Forge Quad.: Bromery, R.W., 18
    West Chester Quad.: Bromery, R.W., 19
  Delaware Co.
    Media Quad.: Bromery, R.W., 8
    Valley Forge Quad.: Bromery, R.W., 18
    West Chester Quad.: Bromery, R.W., 19
  Lancaster Co.
    Conestoga Quad.: Bromery, R.W., 3
    Morgantown Quad.: Bromery, R.W., 10
    Quarryville Quad.: Bromery, R.W., 15
    Safe Harbor Quad.: Bromery, R.W., 16
  Lehigh Co.
    Allentown Quad.: Bromery, R.W., 1
    East Greenville Quad.: Bromery, R.W., 4
    Milford Square Quad.: Bromery, R.W., 9
  Montgomery Co.
    East Greenville Quad.: Bromery, R.W., 4
    Milford Square Quad.: Bromery, R.W., 9
    Norristown Quad.: Bromery, R.W., 11
    Perkiomenville Quad.: Bromery, R.W., 12
    Phoenixville Quad.: Bromery, R.W., 13
    Sassamansville Quad.: Bromery, R.W., 17
    Valley Forge Quad.: Bromery, R.W., 18
  Northampton Co., Allentown Quad.: Bromery, R.W., 1
  Philadelphia Co., Norristown Quad.: Bromery, R.W., 11
  York Co., Safe Harbor Quad.: Bromery, R.W., 16
gravity, Pennsylvania: Hammer, S., 1; Logue, L.L., 1
magnetic, Berks Co.: Hawkes, H.E., Jr., 2
seismic reflection, Pennsylvania: Lyons, P.L., 1

Isopach
Forest-Warren Cos., Devonian Sandstones, Sheffield Quad.: Ingham, A.I., 3

Pennsylvania
  Devonian: Jones, T.H., 2
  Silurian: Amsden, T.W., 1
Southeastern Pennsylvania, Triassic: McKee, E.D., 1

- Western Pennsylvania, Corry Sandstone, Mississippian: Pepper, J.F., 1

Lithofacies
- Pennsylvania
  - Devonian: Jones, T.H., 2; Sutton, R.G., 1
  - Silurian: Amsden, T.W., 1
- Southeastern Pennsylvania, Triassic: McKee, E.D., 1

Miscellaneous
- major faunal elements, Pennsylvania, Silurian: Amsden, T.W., 1

Paleogeographic
- Pennsylvania
  - Devonian: Schuchert, C., 5
  - Paleozoic: Schuchert, C., 11
  - Pennsylvanian: Williams, E.G., 4
  - Tertiary: Matthew, W.D., 1
- Western Pennsylvania, Middle Berea time: Pepper, J.F., 1

Paleogeological
- Pennsylvania
  - Cretaceous: Levorsen, A.I., 1
  - Mississippian: Levorsen, A.I., 1
  - Pennsylvanian: Levorsen, A.I., 1
- Southeastern Pennsylvania, Triassic: McKee, E.D., 1

Physiographic
- Clinton Co., Susquehanna River, upland surface: Denny, C.S., 3
- Eastern Pennsylvania: Evans, L., 1
- Luzerne Co., Susquehanna Valley fill: Ash, S.H., 1
- Northern Pennsylvania, restored upland surface; Denny, C.S., 3
- Northwestern Pennsylvania, glacial geology: Shepps, V.C., 3
- Pennsylvania: Evans, L., 2, 3; Guettard, J., 1; Kalm, P., 1; Lobeck, A.K., 1, 2, 3, 4; Raisz, E.J., 1, 2
  - eolian deposits: National Research Council, 1
  - glacial boundary: Antevs, E.V., 1; Chamberlin, T.C., 3
  - glacial geology: Flint, R.F., 2
  - physiographic divisions: Fenneman, N.M., 2
- Potter Co.
  - Genessee Quad., glacial geology: Denny, C.S., 3
  - Kettle Creek: Denny, C.S., 3
  - Susquehanna River, upland surface: Denny, C.S., 3

Structure
- Cameron Co.
  - Driftwood Quad.: Bolger, R.C., 5
  - southern: Pa. Geol. Survey, 1
- Centre-Clinton Cos., Hyner-Ferney area: Ebright, J.R., 4
- Elk Co., Driftwood Quad.: Bolger, R.C., 5
- Lycoming Co., Hyner-Ferney area: Ebright, J.R., 4
- Northern Pennsylvania: Fettke, C.R., 48; Ingham, A.I., 1
- Northumberland Co., Mt. Carmel Quad.: Rothrock, H.E., 2, 4
- Pennsylvania: King, P.B., 2; Thom, W.T., Jr., 4
- Potter Co., Driftwood Quad.: Bolger, R.C., 5
- Western Pennsylvania: Fettke, C.R., 48

Structure contour
- Butler Co., Butler Quad., Vanport Limestone: Lytle, W.S., 3
- Cambria Co., New Florence Quad., Lower Kittanning Coal: Shaffner, M.N., 1
- Cameron Co.
  - Benzette-Driftwood Gas Field, Oriskany Sandstone: Fettke, C.R., 55
  - Driftwood Gas Field: Bolger, R.C., 5
  - Leidy Gas Field, Pocono Sandstone: Ebright, J.R., 2
- Clearfield Co., Chestnut Ridge Anticline: Bolger, R.C., 3
- Clinton Co.
  - Leidy Gas Field
    - Oriskany Sandstone: Ebright, J.R., 2; Fettke, C.R., 55
    - Pocono Sandstone: Ebright, J.R., 2, 3
- Columbia Co.
  - Ashland Quad.: Haley, B.R., 1, 2
  - Mt. Carmel Quad., Buck Mountain Coal: Rothrock, H.E., 3
- Elk Co.
  - Benzette-Driftwood Gas Field, Oriskany Sandstone: Fettke, C.R., 55
  - Driftwood Anticline, Mercer Formation: Bolger, R.C., 3
- Fayette Co., Donegal Quad., Lower Kittanning Coal: Shaffner, M.N., 2
- Forest Co., Sheffield Quad., Corry Sandstone: Ingham, A.I., 3
- Indiana Co., New Florence Quad., Lower Kittanning Coal: Shaffner, M.N., 1
- McKean Co.
  - Bradford Quad., Bradford Sandstone: Fettke, C.R., 39
  - Smethport Quad., Bradford Sand: Seifert, W.H., 1
- Northern Pennsylvania, Oriskany Sandstone: Fettke, C.R., 48
- Northumberland Co., Mt. Carmel Quad.: Rothrock, H.E., 2, 3, 5
- Northwestern Pennsylvania, Corry Sandstone, Mississippian: Cathcart, S.H., 1

Pennsylvania
  Precambrian surface: Moss, R.G., 1
  salt: Fettke, C.R., 54
Potter Co.
  East Fork-Wharton Gas Field: Bolger, R.C., 5
  Leidy Gas Field: Ebright, J.R., 2
Schuylkill Co.
  Ashland Quad.: Haley, B.R., 1, 2
  Delano Quad.: Maxwell, J.A., 1
  Mammoth Coal Bed: Ashburner, C.A., 2
  Shenandoah Quad.: Daniichik, W., 1; Kehn, T.M., 1
Somerset Co.
  Donegal Quad., Lower Kittanning Coal: Shaffner, M.N., 2
  New Florence Quad., Lower Kittanning Coal: Shaffner, M.N., 1
  southern, Upper Kittanning Coal: Flint, N.K., 2
Warren Co., Sheffield Quad., Corry Sandstone: Ingham, A.I., 3
Western Pennsylvania, Oriskany Sandstone: Fettke, C.R., 48
Westmoreland Co.
  Donegal Quad., Lower Kittanning Coal: Shaffner, M.N., 2
  New Florence Quad., Lower Kittanning Coal: Shaffner, M.N., 1

MARBLE, *see also* Mineral resources
  Philadelphia Co.: Strueve, H., 1

MARSHES, *see also* Glacial geology and Physiography
  Chester Co., origin: Bricker, O.P., Jr., 1
  Crawford Co., Hartstown Bog: Walker, P.C., 1

MERCER COUNTY, *see also* Pennsylvania and Pennsylvania-Western
Historical geology
  Cambrian-Mississippian: Wagner, W.R., 2
Mineralogy
  clay minerals: Droste, J.B., 2
Physical geology
  Henderson Dome: Fettke, C.R., 31

MESOZOIC ERA, *see also* individual periods
  Pennsylvania: King, P.B., 5; Lebling, C., 2; Richards, H.G., 1
  Southeastern Pennsylvania: Hall, J., 3

METAMORPHIC ROCKS, *see also* individual types
  Berks Co., hornblende gneiss: Buckwalter, T.V., Jr., 5
  Bucks Co.: Freedman, J.L., 1
  Chester Co.: Bascom, F., 1
    Honeybrook-Phoenixville Quads.: Postel, A.W., 2
  Lancaster Co.: Bascom, F., 1
  Northampton Co., metadiabase: O'Brien, G.D., 1

METAMORPHISM
  Lancaster Co., Safe Harbor Quarry: Chapman, R.W., 1
  Philadelphia Co., Wissahickon Schist: Wyckoff, D., 1

METEORITES
  Adams Co.: Brezina A., 1; Clarke, F.W., 5; Farrington, O.C., 2, 3; Henderson, E.P., 1
  Allegheny Co.: Brezina, A., 1; Cohen, E., 1; Farrington, O.C., 2, 3; Henderson, E.P., 2; Shepard, C.U., 1
  Lycoming Co.: Farrington, O.C., 3

MICA, *see also* Mineral resources and Mineralogy
  Berks Co.: Buckwalter, T.V., Jr., 2
  Southeastern Pennsylvania: Lewis, H.C., 1

MIFFLIN COUNTY, *see also* Pennsylvania and Pennsylvania-Central
Areal geology
  Upper Lewiston Valley: Lane, M.V., 1
Geochemical investigations
  bitumen, Devonian: Swain, F.M., Jr., 3
Geophysical investigations
  seismic, crustal structure: Katz, S., 1
Historical geology
  Ordovician, bentonite: Whitcomb, L., 3
Paleontology
  Anthozoa, Ordovician: Bassler, R.S., 4
  Brachiopoda, Silurian: Cloud, P.E., Jr., 1
  fucoid, Silurian: Harlan, R., 2, 4
  Ostracoda, Silurian: Swartz, C.K., 5
Physiographic geology
  caves: Landis, C., 3
    Aitken Cave: Anonymous, 28; Parker, J.D., 1
    Bottomless Pitch Pit Cave: Matthews, L., 1
    Brubaker Cave: Anonymous, 32
    Dave's Cave: Haas, J., 1
    Diamond I Cave: Hassemer, G., 1
    Goss Cave: Anonymous, 39
    Milroy Caves: Anonymous, 37
    Nails No. 1 Cave: Anonymous, 30
    Rupert Cave: Smeltzer, B.L., 2
    Seawra Cave: Anonymous, 36

MILLERITE, *see also* Mineralogy
  Lancaster Co.: Genth, F.A., 3

MINERAL COLLECTING, *see also* individual types and Mineralogy
- Eastern Pennsylvania, popular: Myers, R.E., 1
- Northampton Co.: Montgomery, A., 1; Zodac, P., 1
- Pennsylvania: Lapham, D.M., 4

MINERAL RESOURCES, *see also* individual types
- Pennsylvania: Greenwald, H.P., 1; Sanford, S., 1; Schanz, J.J., Jr., 1; Schroeder, F.C., 1; **Stephenson,** R.C., 1; Wyer, S.S., 1
  - industrial minerals: Stephenson, R.C., 2
  - metal: Gault, H.R., 1

MINERAL SPRINGS, *see* Springs

MINERALOGY, *see also* individual minerals
- Bucks Co.: Carpenter, G.W., 2
- Chester Co.: Carpenter, G.W., 2
- glacial till, electron micrography: Droste, J.B., 3
- Lancaster Co., chromium minerals, popular: Duersmith, L.J., 1
- Montgomery Co., Triassic: Wherry, E.T., 2
- Pennsylvania, electron photomicrographs: Bates, T.F., 3
- Pennsylvania State Univerity: Thornton, C.P., 1
- Philadelphia Co.: Carpenter, G.W., 2
- Southeastern Pennsylvania, analysis: Clarke, F.W., 6

MISSISSIPPIAN PERIOD, *see also* Paleozoic Era
- Bedford Co., Bedford Quad.: Terriere, R.T., 1
- Blair Co.: Swartz, F.M., 8
- Butler Co.: Fettke, C.R., 15; Lytle, W.S., 10
- Cambria Co., New Florence Quad.: Shaffner, M.N., 1, 5
- Cameron Co.: Bolger, R.C., 6; Fettke, C.R., 43
  - Driftwood Quad.: Bolger, R.C., 5
- Carbon Co.: Gault, H.R., 4
- Central Pennsylvania: Arndt, H.H., 1; Ebright, J.R., 4; Swartz, F.M., 5; Willard, B., 17
- Clarion Co.: Lesley, J.P., 6
- Clinton Co.: Ebright, J.R., 4; Ingham, A.I., 2
  - Leidy Gas Field: Ebright, J.R., 2, 3
- Crawford Co., Berea Sandstone: deWitt, W., Jr., 1
- Elk Co.: Ashburner, C.A., 1; Fettke, C.R., 35, 37
  - Berea Sandstone: deWitt, W., Jr., 1
  - Driftwood Quad.: Bolger, R.C., 5
- Fayette Co.: Sherrill, R.E., 1
  - Donegal Quad.: Shaffner, M.N., 2
- Forest Co.: Fettke, C.R., 10
  - Sheffield Quad.: Ingham, A.I., 3
- Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
- Jefferson Co.: Swartz, F.M., 8
- Lycoming Co.: Ebright, J.R., 4
- McKean Co.: Ashburner, C.A., 1; Fettke, C.R., 26
- Mercer Co.: Wagner, W.R., 2
- Northeastern Pennsylvania: Arndt, H.H., 1; Dyson, J.L., 2; Willard, B., 5
  - Pocono Sandstone: Leonard, A.D., 1
- Northwestern Pennsylvania: Lytle, W.S., 13; Szmuc, E.J., 1; Tesmer, I.H., 1
- Pennsylvania: Levorsen, A.I., 1; Willard, B., 6
  - floral zones: Jongmans, W.J., 1
  - Pocono Formation: Pelletier, B.R., 1
- Potter Co., Driftwood Quad.: Bolger, R.C., 5
- Schuylkill Co., Minersville-Tremont Quads.: Wood, G.H., Jr., 2
- Somerset Co.
  - Donegal Quad.: Shaffner, M.N., 2
  - Meyersdale Quad.: Flint, N.K., 1
  - New Florence Quad.: Shaffner, M.N., 1, 5
  - southern: Flint, N.K., 2
- Southwestern Pennsylvania: Stevenson, J.J., 1; Swales, W.E., 1; Wray, J.L., 1
  - Pocono Formation: Dodson, C.L., 1
- Venango Co.: Lytle, W.S., 10, 12
  - Berea Sandstone: deWitt, W., Jr., 1
- Warren Co.: Fettke, C.R., 19, 20, 24, 33
  - Sheffield Quad.: Ingham, A.I., 3
- Western Pennsylvania: Fettke, C.R., 42, 55; Lytle, W.S., 2; Robinson, J.F., 1
  - Bedford-Berea Formations: Pepper, J.F., 1
- Westmoreland Co.
  - Donegal Quad.: Shaffner, M.N., 2
  - New Florence Quad.: Shaffner, M.N., 1, 5

MOLLUSCA, *see also* individual types
- Bucks Co., Triassic: McLaughlin, D.B., 6
- Central Pennsylvania, Devonian. Percival, S.F., 1

MONROE COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern

Areal geology
  Chestnut Ridge: Lein, C.A., 1
  Godfrey Ridge: Trexler, J.P., 1
  Saylorsburg-Stormville area: Graham, T.K., 1
  Wind Gap Quad.: McGlade, W.G., 1
Historical geology
  Devonian: Cooper, G.A., 1
  Silurian-Devonian, Delaware Water Gap Quad.: Kurtz, A.E., 1
Mineralogy
  quartz: Lee, O.I., 1
Paleontology
  Delaware Water Gap fauna, Ordovician-Silurian: Willard, B., 1
  coral zone, Devonian: Beerbower, J.R., 1
  Eurypterida, Silurian: O'Connell, M., 1
  Pisces, Silurian: Beerbower, J.R., 2
Physical geology
  cleavage, Delaware Water Gap: Fourmarier, P.F., 1
Physiographic geology
  glacial gravel: MacClintock, P., 2

MONTGOMERY COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
Areal geology
  Gulf Mills-West Conshohocken area: Janson, G.J., 1
Economic geology
  copper: Earl, K.M., 3
Geophysical investigations
  aeromagnetic
    East Greenville Quad.: Socolow, A.A., 4
    Milford Square Quad.: Socolow, A.A., 8
    Norristown Quad.: Socolow, A.A., 10
    Perkiomenville Quad.: Socolow, A.A., 11
    Phoenixville Quad.: Socolow, A.A., 12
    Sassamansville Quad.: Socolow, A.A., 16
    Valley Forge Quad.: Socolow, A.A., 17
  dip needle traverse: Randall, R.A., 1
Ground water
  Montgomery Co.: Barksdale, H.C., 1
    Lansdale area: Rima, D.R., 1
    Triassic area: Bock, W., 8
Historical geology
  Ordovician: Storm, P.J., 1
  Triassic: Lyman, B.S., 3
Maps
  aeromagnetic
    East Greenville Quad.: Bromery, R.W., 4
    Milford Square Quad.: Bromery, R.W., 9
    Norristown Quad.: Bromery, R.W., 11
    Perkiomenville Quad.: Bromery, R.W., 12
    Phoenixville Quad.: Bromery, R.W., 13
    Sassamansville Quad.: Bromery, R.W., 17
    Valley Forge Quad.: Bromery, R.W., 18
  geologic: Barksdale, H.C., 1
Mineralogy
  Newark Group, Triassic: Wherry, E.T., 2
Paleontology
  Amphibia, Triassic: Huene, F., von, 2
  Branchiopoda, Triassic: Bock, W., 4
  Gastropoda, Ordovician: Richards, H.G., 3
  Mammalia, Pleistocene: Hall, E.R., 1; Hibbard, C.W., 1, 2
    puma: Simpson, G.G., 1
    tapir: Simpson, G.G., 2
  Nautiloidea, Ordovician: Richards, H.G., 3; Ulrich, E.O., 6
  Pelecypoda, Triassic: Conrad, T.A., 1
  Pisces, Triassic: Bock, W., 6; Schaeffer, B., 1, 3
  plant, Triassic: Cook, G.H., 1
  Reptilia
    snake, Pleistocene: Gilmore, C.W., 1
    Triassic: Cope, E.D., 2
Petrology
  basalt: Washington, H.S., 1
Physical geology
  faults, Triassic: Watson, E.H., 3
Physiographic geology
  caves: Parker, J.D., 2

NATURAL GAS, *see also* Mineral resources
  Butler Co., Butler Quad.: Lytle, W.S., 3
  Cambria Co., New Florence Quad.: Shaffner, M.N., 1, 5
  Cameron Co.: Bolger, R.C., 4
    Driftwood Quad.: Bolger, R.C., 5
  Clearfield Co.: Bolger, R.C., 3; Brown, W.B., 3d, 1
  Clinton Co.: Cathcart, S.H., 3; Ingham, A.I., 2
    Leidy Gas Field: Ebright, J.R., 2, 3; Gouse, H.V., 1; Wilcox, Q.L., 1
  Elk Co.: Bolger, R.C., 3, 4; Brown, W.B., 3d, 1
    Driftwood Quad.: Bolger, R.C., 5
  Fayette Co.: Grasty, J.S., 1
    Donegal Quad.: Shaffner, M.N., 2
  Forest Co., Sheffield Quad.: Ingham, A.I., 3
  Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5

McKean Co.
  Bradford Quad.: Fettke, C.R., 39
  Smethport Quad.: Seifert, W.H., 1
Northeastern Pennsylvania: Willard, B., 5
Northern Pennsylvania: Fettke, C.R., 36; Ingham, A.I., 1
Northwestern Pennsylvania: Cathcart, S.H., 1
Pennsylvania, reserves: U. S. Geol. Survey, 1
Potter Co., Driftwood Quad.: Bolger, R.C., 5
Somerset Co.
  Donegal Quad.: Shaffner, M.N., 2
  New Florence Quad.: Shaffner, M.N., 1, 5
  southern: Flint, N.K., 2
Tioga Co.: Ashley, G.H., 3; Robinson, J.F., 2
Warren Co., Sheffield Quad.: Ingham, A.I., 3
Western Pennsylvania: Bownocker, J.A., 1; Cathcart, S.H., 5; Fettke, C.R., 2, 3, 4, 5, 28, 38, 40, 42, 44, 46, 50, 51, 53, 55; Lafferty, R.C., 1; Lytle, W.S., 5, 7, 9; Myers, T.H., 1; Pa. Geol. Survey, 1; Rittenhouse, G., 1; Robinson, J.F., 1; Swartz, F.M., 3; White, I.C., 5; Woodward, H.P., 5
  helium content: Anderson, C.C., 1; Boone, W.J., Jr., 1
Westmoreland Co.: Grasty, J.S., 1
  Donegal Quad.: Shaffner, M.N., 2
  New Florence Quad.: Shaffner, M.N., 1, 5

NAUTILOIDEA, *see also* Invertebrata
Bedford Co., Silurian: Swartz, C.K., 5
Bradford Co., Devonian: Hall, J., 18, 19
Centre Co., Ordovician: Foerste, A.F., 2; Ulrich, E.O., 6
Cumberland Co., Ordovician, Trenton Limestone: Hall, J., 2
Dauphin Co., Devonian: Cramer, H.R., 3
Fayette Co., Devonian: Flower, R.H., 1
Franklin Co., Ordovician: Ulrich, E.O., 6
Lehigh Co.
  Cambrian: Ulrich, E.O., 7
  Ordovician: Ulrich, E.O., 3
Montgomery Co., Ordovician: Richards, H.G., 3; Ulrich, E.O., 6
Warren Co.
  Devonian: Hall, J., 12
  Mississippian: Hall, J., 18, 19
Western Pennsylvania, Pennsylvanian: Unklesbay, A.G., 1

NEPHRITE, *see also* Mineralogy
Northampton Co.: Clarke, F.W., 1

NICKEL, *see also* Mineral resources and nickel-bearing minerals
Lancaster Co.: Barlow, A.E., 1; Campbell, W., 1, 2; Dickeson, M.W., 1
  geobotanical evidence: Good, R.S., 1

NICKELLITE, *see also* Mineralogy
Lancaster Co.: Blake, W.P., 1

NITRATE, *see also* Mineral resources
Tioga-Westmoreland Cos.: Mansfield, G.R., 1

NORTHAMPTON COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
Areal geology
  Camels Hump area: Bellerjeau, O.T., 1
  Monocacy Creek area: Burns, R.E., 1
  Pinetop area: Bellerjeau, O.T., 1
Economic geology
  slate: Behre, C.H., Jr., 1
Geobotanical investigations
  Bethlehem area: Stingelin, R.W., 1
Geophysical investigations
  aeromagnetic, Allentown Quad.: Socolow, A.A., 1
  magnetic, fault: Kell, J.A., 1
  radioactivity survey: Stewart, R.H., 1
  seismic, overburden thickness: Linehan, D., 1
  x-ray diffraction, slate: Anderson, H.V., 1
Ground water
  artesian wells: Woolman, L., 1
Historical geology
  Cambrian: Willard, B., 12
  radioactive dating: Jaffe, H.W., 1
Maps
  aeromagnetic, Allentown Quad.: Bromery, R.W., 1
Mineralogy
  beraunite, popular: Zodac, P., 1
  boltwoodite: Montgomery, A., 6
  cacoxenite: Gordon, S.G., 1; Zodac, P., 1
  mineral locations: Montgomery, A., 1
  nephrite: Clarke, F.W., 1
  thorogummite: Montgomery, A., 6
  tremolite: Clarke, F.W., 1
  uraninite: Montgomery, A., 6
  vermiculite: Catlett, C., 1; Clarke, F.W., 1
Paleontology
  algae, Cambrian: Howell, B.F., Sr., 3
  Brachiopoda, Cambrian: Howell, B.F., Sr., 3
  Trilobita, Cambrian: Howell, B.F., Sr., 3

- *Petrology*
  - Allentown Dolomite: Moser, E.L., Jr., 1
    - insoluble residues: Engman, H.A., 1
  - metadiabase, Ordovician: O'Brien, G.D., 1
  - pegmatites: Virgin, W.W., Jr., 1
  - pinite schist: Virgin, W.W., Jr., 2
  - serpentine: Sarda, G.S., 1
  - serpentine-talc deposits: Montgomery, A., 4
- *Physical geology*
  - mudcracks: Willard, B., 12
  - ripplemark: Willard, B., 12
  - structure, Lehigh Gap area: Macfayden, J.A., Jr., 1
- *Physiographic geology*
  - glacial gravel: MacClintock, P., 2

NORTHUMBERLAND COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern

- *Economic geology*
  - coal, anthracite: Roberts, W.F., 12
    - Mt. Carmel Quad.: Rothrock, H.E., 2, 3, 4, 5
- *Maps*
  - economic, coal, anthracite, Mt. Carmel Quad.: Rothrock, H.E., 2, 4, 5
  - structure, Mt. Carmel Quad.: Rothrock, H.E., 2, 4, 5
  - structure contour, Mt. Carmel Quad., Buck Mountain Coal: Rothrock, H.E., 2, 3
- *Mineralogy*
  - clay: Clarke, F.W., 1
- *Paleontology*
  - Brachiopoda, Silurian: Cloud, P.E., Jr., 1
  - Trilobita, Devonian: Green, J., 1

OCHRE, *see also* Mineral resources

- Bucks Co.: Gault, H.R., 5

OIL, *see* Petroleum

OIL AND GAS FIELDS, *see also* Natural gas, Petroleum, and Mineral resources

- Bradford Oil Field, McKean Co.: Fettke, C.R., 49
- Butler Co., Butler Quad.: Lytle, W.S., 3
- Driftwood-Benzette Gas Field, Cameron-Elk Cos.: Bolger, R.C., 4
- Hamilton Corners Oil Field, Venango Co.: Fettke, C.R., 49
- Leidy Gas Field, Clinton Co.: Ebright, J.R., 2; Gouse, H.V., 1; Ingham, A.I., 2; Wilcox, Q.L., 1
- McKean Co.
  - Bradford Quad.: Fettke, C.R., 39
  - Smethport Quad.: Seifert, W.H., 1
- Pennsylvania: Pa. Geol. Survey, 2
- South Leidy Gas Field, Clinton Co.: Ingham, A.I., 2
- Tioga Gas Field, Tioga Co.: Robinson, J.F., 2
- Western Pennsylvania: Jones, T.H., 1

OIL SHALE, *see also* Mineral resources

- Eastern Pennsylvania: Schweinfurth, S.P., 1
- Pennsylvania, reserves: Heald, K.C., 1
- Western Pennsylvania: Jillson, W.R., 1

OOLITES

- Central Pennsylvania, Cambro-Ordovician: MacPherson, L.A., 1
- Centre Co., Cambrian: Choquette, P.W., 1

ORDOVICIAN PERIOD, *see also* Paleozoic Era

- Adams Co., Carlisle Quad.: Stose, G.W., 4
- Berks Co.: Gault, H.R., 3; Hobson, J.P., Jr., 1; Moseley, J.R., 2
  - diabase: Buckwalter, T.V., Jr., 4
  - Reading Quad.: Hobson, J.P., Jr., 2
- Blair Co.: Swartz, F.M., 8
- Bucks Co.: Willard, B., 19, 20
- Butler Co.: Fettke, C.R., 15
- Central Pennsylvania: Arndt, H.H., 1; Donaldson, A.C., 1; Field, R.M., 1; Swain, F.M., Jr., 1; Swartz, F.M., 5; Willard, B., 17
  - Axemann Limestone: Macauley, G.R., 1
  - Larke Dolomite: Prouty, C.E., 3
  - petrography: Bergenback, R.E., 1
- Centre Co.: Folk, R.L., 3; Swartz, F.M., 6
- Chester Co.: Watson, E.H., 2
- Clinton Co.: Whitcomb, L., 1
- Cumberland Co.: Stose, G.W., 2
  - Carlisle Quad.: Stose, G.W., 4
- Dauphin Co.: Stose, G.W., 2
- Eastern Pennsylvania, petrography: Bergenback, R.E., 1
- Elk Co.: Fettke, C.R., 35, 37
- Erie Co.: Fettke, C.R., 11, 14, 23; Wagner, W.R., 3
- Franklin Co.: Neuman, R.B., 1; Palacas, J.G., 1
  - Beekmantown Group: Sando, W.J., 1
- Lancaster Co.: Wise, D.U., 1
  - Conestoga Limestone: Cramer, H.R., 1
- Lebanon Co.: Gray, C., 5, 7, 8; Svetlich, W.G., 1

  - igneous rocks: Urry, W.D., 1
  - Lebanon Quad.: Geyer, A.R., 3
  - Martinsburg Formation: Moseley, J.R., 3, 5
  - Richland Quad.: Gray, C., 12
- Lehigh Co.: Stose, G.W., 3
- McKean Co.: Fettke, C.R., 32; Hoffacker, B.L., Jr., 1
- Mercer Co.: Wagner, W.R., 2
- Mifflin Co., bentonite: Whitcomb, L., 3
- Montgomery Co.: Storm, P.J., 1
- Northeastern Pennsylvania: Arndt, H.H., 1; Willard, B., 5
- Northern Pennsylvania: Fettke, C.R., 34
- Northwestern Pennsylvania: Cathcart, S.H., 2; Linn, E.H., 3
- Pennsylvania: Kay, G.M., 1; Swartz, F.M., 1, 3; Twenhofel, W.H., 2; Willard, B., 6
  - paleocurrents: Yeakel, L., 2
- Philadelphia Co.: Watson, E.H., 2
  - Wissahickon Schist: Frondel, J.W., 1
- Southcentral Pennsylvania: Cooper, G.A., 4; Craig, L.C., 1
  - Stones River Group: Prouty, C.E., 4
- Southeastern Pennsylvania: Dyson, J.L., 2; Frazer, P., Jr., 3; Geyer, A.R., 2; Gray, C., 4, 9; Hobson, J.P., Jr., 3; Hunt, T.S., 2, 3; Johnson, M.E., 4; Kobayashi, T., 1; Mathews, E.B., 1; Moseley, J.R., 1; Prouty, C.E., 1, 7; Willard, B., 18
  - Delaware Valley: Richards, H.G., 2
- Warren Co.: Fettke, C.R., 8, 28
- Western Pennsylvania: Fettke, C.R., 42, 55; Robinson, J.F., 1; Rogers, D., Jr., 1
- York Co., Carlisle Quad.: Stose, G.W., 4

OSTRACODA, *see also* Arthropoda, Crustacea, and Invertebrata
- Bedford-Blair Cos., Silurian: Swartz, C.K., 5
- Central Pennsylvania
  - Devonian: Swartz, F.M., 7
  - Ordovician: Swain, F.M., Jr., 1
  - Silurian: Swartz, F.M., 7; Wainwright, J.E.N., 1
- Chester Co., Triassic: Jones, T.R., 1
- Franklin Co.
- Ordovician: Sando, W.J., 1; Swain, F.M., Jr., 2
  - Silurian: Swartz, C.K., 5
- Huntingdon Co., Ordovician: Swain, F.M., Jr., 2
- Juniata Co., Silurian: Hoskins, D.M., 1; Swartz, C.K., 5
- Mifflin Co., Silurian: Swartz, C.K., 5
- Pennsylvania, Ordovician-Devonian: Bassler, R.S., 2
- Snyder Co., Silurian: Hoskins. D.M., 1
- Southwestern Pennsylvania, Permian: Holland, W.C., 1
- Western Pennsylvania, Pennsylvanian: Gillespie, R.F., 1

PALEOBOTANY, *see also* individual groups
- Armstrong Co.
  - seed pod: Hamilton, H.V., 3
  - spores, Pennsylvanian: Rifflemacher, W.E., 1
- Beaver Co.
  - fungus, Pennsylvanian: Lesquereux, L., 1
  - seed pod, Pennsylvanian: Hamilton, H.V., 3
  - spores, Pennsylvanian: Ferm, J.C., 1
- Bucks Co.
  - algae, Triassic: McLaughlin, D.B., 6
  - Triassic fauna: Bock, W., 1; Britton, N.L., 1; McLaughlin, D.B., 6
- Carbon Co.
  - Devonian: Goeppert, J.H.R., 2
  - Mississippian, Mauch Chunk Formation: Arber, E.A.N., 1
  - Pennsylvanian: Darrah, W.C., 4; Goeppert, J.H.R., 4
- Centre Co.
  - algae, Cambrian: Tasch, P., 2
  - pollen, Pleistocene: Martin, P.S., 2; Sears, P.B., 1
- Dauphin Co., spores (?), Devonian: Cramer, H.R., 3
- Elk Co., seed pod, Pennsylvanian: Hamilton, H.V., 3
- Franklin Co., algae, Ordovician: Neuman, R.B., 1
- Greene Co., Permian: Cross, A.T., 6
- Indiana Co., Pennsylvanian: Harlan, R., 5
- Lackawanna Co., Pennsylvanian: Fairchild, H.L., 1
- Luzerne Co., Pennsylvanian: Fairchild, H.L., 1
- McKean Co., Devonian: Arnold, C.A., 2
- Montgomery Co., Triassic: Cook, G.H., 1
- Northeastern Pennsylvania
  - Pennsylvanian: Teschemacher, J.E., 1
  - plants: Bailey, J.W., 1
- Northampton Co., algae, Cambrian: Howell, B.F., Sr., 3
- Pennsylvania
  - Devonian: Arnold, C.A., 1; Goeppert, J.H.R., 3
  - Mississippian: Arnold, C.A., 1; Goeppert, J.H.R., 3
    - Pocono Formation: Read, C.B., 1

    Paleozoic: Schimper, W.P., 1
    Pennsylvanian: Goeppert, J.H.R., 1; Lesquereux, L., 2; Sternberg, K.M., 1
    Permian: Lesquereux, L., 2
    plants: Abbott, M.L., 2
    Silurian: Goeppert, J.H.R., 3
  Philadelphia Co., Pleistocene: Rafinesque, C.S., 2
  Perry Co., fucoids, Devonian: Rafinesque, C.S., 3
  Schuylkill Co.
    Pennsylvanian: Abbott, M.L., 1; Harlan, R., 3
    spore, Mississippian: Chaloner, W.G., 1
    trees, Pennsylvanian: Gresley, W.S., 2
  Southeastern Pennsylvania, Triassic flora: Knowlton, F.H., 2
  Southwestern Pennsylvania: Miklausen, A.J., 1
  Washington Co., Permian: Cross, A.T., 6
  Western Pennsylvania
    microfossil assemblages: Denton, G.H., 1
    spores, Pennsylvanian: Cross, A.T., 2; Sprunk, G.C., 1
  York Co., Triassic: Berry, E.W., 1

PALEONTOLOGY
  Cambrian
    algae
      Centre Co.: Tasch, P., 2
      Northampton Co.: Howell, B.F., Sr., 3
    Brachiopoda
      Bucks Co.: Howell, B.F., Sr., 5
      Central Pennsylvania: Tasch, P., 4
      Northampton Co.: Howell, B.F., Sr., 3
      York Co.: Walcott, C.D., 1, 2, 3, 5
    Branchiopoda, Bucks Co.: Howell, B.F., Sr., 5
    Crustacea, Lancaster Co.: Resser, C.E., 2
    Nautiloidea, Lehigh Co.: Ulrich, E.O., 7
    Trilobita
      Bedford Co.: Walcott, C.D., 7
      Blair Co.: Resser, C.E., 4, 8; Walcott, C.D., 6
      Bucks Co.: Howell, B.F., Sr., 5
      Central Pennsylvania: Balk, C.L., 1; Wilson, J.L., 1, 2
      Centre Co.: Resser, C.E., 5, 6, 8; Walcott, C.D., 6, 8, 9
      Franklin Co.: Rasetti, F.R.D., 1; Resser, C.E., 7; Walcott, C.D., 4
      Lancaster Co.: Walcott, C.D., 5, 6
      Northampton Co.: Howell, B.F., Sr., 3
      York Co.: Resser, C.E., 5; Walcott, C.D., 7
    Warrior Formation fauna, Central Pennsylvania: Tasch, P., 1
    worms
      Chester-Lehigh Cos.: Lyman, B.S., 5
      Southeastern Pennsylvania: Goeppert, J.H.R., 2
  Devonian
    Ammonoidea, Bradford Co.: Hall, J., 10
    Anthozoa
      Bedford Co.: Swartz, C.K., 1
      Monroe Co.: Beerbower, J.R., 1
      Pennsylvania: Bassler, R.S., 4
    Blastoidea, Dauphin Co.: Cramer, H.R., 3
    Brachiopoda
      Bedford Co.: Clarke, J.M., 3; Hall, J., 7; Schuchert, C., 4
      Bradford Co.: Hall, J., 21
      Centre Co.: Percival, S.F., 1
      Columbia Co.: Kindle, E.M., 1
      Crawford Co.: Hall, J., 7, 21; Schuchert, C., 1
      Erie Co.: Schuchert, C., 1
      Fulton Co.: Clarke, J.M., 3
      Northern Pennsylvania: Hall, J., 21, 22
      Northwestern Pennsylvania: Cooper, G.A., 3; Greiner, H., 1; Holland, F.D., Jr., 1
      Perry Co.: Hall, J., 21
      Schuylkill Co.: Cloud, P.E., Jr., 1
      Tioga Co.: Hall, J., 6, 7, 21
      Warren Co.: Hall, J., 21; Schuchert, C., 1
    Bryozoa
      Bedford Co.: Ulrich, E.O., 1
      Lebanon-Perry Cos.: McNair, A.H., 1
      Catskill Formation: Chadwick, G.H., 5
    Conodonts, Northwestern Pennsylvania: Hass, W.H., 1, 2
    Crinoidea, Blair-Erie Cos.: Goldring, W., 1
    Crustacea, Erie-Warren Cos.: Hall, J., 20
    Echinoidea, Crawford Co.: Hall, J., 8; Keyes, C.R., 2
    Edrioasteroidea, Tioga Co.: Clarke, J.M., 2
    Eurypterida
      Erie Co.: Hall, J., 20; Harlan, R., 2
      restoration: Beecher, C.E., 1
      Warren Co.: Kjellesvig-Waering, E.N., 1
    Gastropoda
      Bedford Co.: Ohern, D.W., 1

  Crawford Co.: Hall, J., 12
hydrozoan, Bedford Co.: Swartz, C.K., 1
Invertebrata
  Pennsylvania: Swartz, F.M., 10
  Perry Co.: Rafinesque, C.S., 3
McKean Co., fauna: Metz, C.T., 1
Mollusca, Centre Co.: Percival, S.F., 1
Monroe Co., Delaware Water Gap: Willard, B., 1
Nautiloidea
  Bradford Co.: Hall, J., 18, 19
  Dauphin Co.: Cramer, H.R., 3
  Fayette Co.: Flower, R.H., 1
  Warren Co.: Hall, J., 12
Ostracoda
  Central Pennsylvania: Swartz, F.M., 7
  Pennsylvania: Bassler, R.S., 2
Pelecypoda
  Bedford Co.: Clarke, J.M., 3; Ohern, D.W., 1
  Crawford Co.: Hall, J., 9
  Fayette Co.: Hall, J., 17
  Northwestern Pennsylvania: Hall, J., 13, 15, 16, 17
  Perry Co.: Rafinesque, C.S., 6
  Southwestern Pennsylvania: Rau, J.L., 1
  Sullivan Co.: Hall, J., 17
  Tioga Co.: Eiler, E.R., 1
Pennsylvania, type specimens: Wagner, Free Inst. Science, 1
Pisces
  Bradford Co.: Eastman, C.R., 2
  Northern Pennsylvania: Eastman, C.R., 2; Newberry, J.S., 2
  Tioga Co.: Cope, E.D., 7; Eastman, C.R., 2; Newberry, J.S., 2
  Warren Co.: Eastman, C.R., 1, 2
plants
  Carbon Co.: Goeppert, J.H.R., 2
  McKean Co.: Arnold, C.A., 2
  Pennsylvania: Arnold, C.A., 1; Goeppert, J.H.R., 3
Porifera
  Crawford Co.: Caster, K.E., 3
  Erie Co.: Caster, K.E., 3; Clarke, J.M., 6; Hall, J., 14, 23
  Northwestern Pennsylvania: Caster, K.E., 4
  Susquehanna Co.: Hall, J., 23
  Tioga Co.: Hall, J., 23
  Warren Co.: Caster, K.E., 3; Hall, J., 14, 23
Pteropoda, Huntingdon Co.: Hall., J., 12
spores (?), Dauphin Co.: Cramer, H.R., 3
Stelleroidea
  Central Pennsylvania: Schuchert, C., 7
  Pike Co.: Cramer, H.R., 4
Tentaculitida, Centre Co.: Percival, S.F., 1
Trilobita
  Carbon Co.: Green, J., 1
  Huntingdon Co.: Delo, D.M., 1
  Northumberland Co.: Green, J., 1
  Pennsylvania: Delo, D.M., 1; Hall, J., 5

Mississippian
Brachiopoda
  McKean Co.: Hall, J., 21, 22
  Northwestern Pennsylvania: Hall, J., 21; Holland, F.D., Jr., 1
  Venango Co.: Winchell, A., 1
  Warren Co.: Hall, J., 21
Branchiopoda, Schuylkill Co.: Jones, T.R., 1, 2; Raymond, P.E., 3
Edrioasteroidea, Warren Co.: Clarke, J.M., 2; Foerste, A.F., 1
Eurypterida, Warren Co.: O'Connell, M., 1
Foraminifera, Southwestern Pennsylvania: Wray, J.L., 2
Gastropoda, Venango Co.: Winchell, A., 1
Nautiloidea, Warren Co.: Hall, J., 18, 19
Pelecypoda, Southwestern Pennsylvania: Rau, J.L., 1
Pennsylvania, floral zones: Jongmans, W.J., 1
Pisces
  Allegheny Co.: Newberry, J.S., 2
  Blair Co.: Hay, O.P., 1
  Venango Co.: Newberry, J.S., 1
plants
  Carbon Co.: Arber, E.A.N., 1
  Pennsylvania: Arnold, C.A., 1; Goeppert, J.H.R., 3
    Pocono Formation: Read, C.B., 1
Porifera
  Northwestern Pennsylvania: Caster, K.E., 4
  Venango Co.: Hall, J., 14, 23
  Warren Co.: Hall, J., 14, 23
spores, Schuylkill Co.: Chaloner, W.G., 1
Trilobita, Pennsylvania: Weller, J.M., 1

Ordovician
Anthozoa
  Blair Co.: Bassler, R.S., 4
  Centre Co.: Bassler, R.S., 4
  Eastern Pennsylvania: Okulitch, V.J., 1
  Franklin Co.: Bassler, R.S., 4
  Mifflin Co.: Bassler, R.S., 4

- Brachiopoda
  - Blair Co.: Ulrich, E.O., 4
  - Centre Co.: Ulrich, E.O., 5
  - Franklin Co.: Ulrich, E.O., 5
  - Huntingdon Co.: Ulrich, E.O., 5
  - Lehigh Co.: Ulrich, E.O., 5
  - Pennsylvania: Cooper, G.A., 5
- Centre Co., Trenton Limestone fauna: Schneider, A.F., 1
- Franklin Co., Beekmantown Group: Sando, W.J., 1
- Gastropoda
  - Bedford Co.: Rafinesque, C.S., 5
  - Cumberland Co.: Hall, J., 2
  - Montgomery Co.: Richards, H.G., 3
- Lycoming Co., Reedsville Shale: Gross, C.M., 1
- Monroe Co., Delaware Water Gap: Willard, B., 1
- Nautiloidea
  - Centre Co.: Foerste, A.F., 2; Ulrich, E.O., 6
  - Cumberland Co.: Hall, J., 2
  - Franklin Co.: Ulrich, E.O., 6
  - Lehigh Co.: Ulrich, E.O., 3
  - Montgomery Co.: Richards, H.G., 3; Ulrich, E.O., 6
- Ostracoda
  - Franklin-Huntingdon Cos.: Swain, F.M., Jr., 2
  - Pennsylvania: Bassler, R.S., 2
- Pelecypoda, Cumberland Co.: Hall, J., 2
- Southern Pennsylvania, faunal suites: Cooper, G.A., 4
- Stelleroidea, Lebanon Co.: Cramer, H.R., 2
- Trilobita
  - Centre Co.: Tasch, P., 3; Walcott, C.D., 8, 9; Whittington, H.B., 1
  - Clinton Co.: Whittington, H.B., 1
  - Cumberland Co.: Hall, J., 2
  - Franklin Co.: Cooper, B.N., 1
  - Lebanon Co.: Whittington, H.B., 1

Paleozoic
- algae, Pennsylvania: Fenton, C.L., 1
- Eastern Pennsylvania, fauna: Sharpe, D., 1
- Invertebrata, Pennsylvania: Grabau, A.W., 1; Shimer, H.W., 4
- Pisces, Pennsylvania: Newberry, J.S., 4
- plants, Pennsylvania: Schimper, W.P., 1

Pennsylvanian
- Amphibia
  - Allegheny Co.: Romer, A.S., 3; Vaughan, P.P., 1
  - Beaver Co.: Moodie, R.L., 1, 2
  - Southwestern Pennsylvania: Romer, A.S., 2
  - Western Pennsylvania: Cope, E.D., 1
  - Westmoreland Co., tracks: Hitchcock, E., 1
- Anthozoa, Western Pennsylvania: Bassler, R.S., 4
- Branchiopoda
  - Cambria Co.: Raymond, P.E., 3
  - Luzerne Co.: Packard, A.S., Jr., 1
- Eurypterida
  - Beaver Co.: Cope, E.D., 4, 6; Kjellesvig-Waering, E.N., 1, 2; O'Connell, M., 1
  - Venango Co.: Kjellesvig-Waering, E.N., 1; O'Connell, M., 1
- Gastropoda, Allegheny Co.: Meek, F.B., 1
- Insecta, Pennsylvania: Handlirsch, A., 1
  - cockroach, Luzerne Co.: Scudder, S.H., 1, 2
- Luzerne Co., Mill Creek Limestone fauna: Chow, M.M., 1
- Nautiloidea, Western Pennsylvania: Unklesbay, A.G., 1
- Ostracoda, Western Pennsylvania: Gillespie, R.F., 1
- Pelecypoda
  - Allegheny Co.: Doney, H.H., 1
  - Carbon Co.: Davies, J.H., 1
  - Pennsylvania: Davies, J.H., 1
- Pennsylvania, floral zones: Bertrand, P., 1; Bode, H., 1; Jongmans, W.J., 1
- Pisces
  - Allegheny Co.: Romer, A.S., 3
  - Beaver Co.: Cope, E.D., 4,6; Lesquereux, L., 1
- plants
  - Carbon Co.: Darrah, W.C., 4; Goeppert, J.H.R., 4
  - Indiana Co.: Harlan, R., 5
  - Lackawanna Co.: Fairchild, H.L., 1
  - Luzerne Co.: Fairchild, H.L., 1
  - Northeastern Pennsylvania: Bailey, J.W., 1; Teschemacher, J.E., 1
  - Pennsylvania: Abbott, M.L., 2; Goeppert, J.H.R., 1; Lesquereux, L., 2; Sternberg, K.M., 1
  - Schuylkill Co.: Abbott, M.L., 1; Gresley, W.S., 2; Harlan, R., 3
  - Southwestern Pennsylvania: Miklausen, A.J., 1
- Reptilia, Allegheny Co.: Case, E.C., 1
- seed pod, Armstrong-Beaver-Elk Cos.: Hamilton, H.V., 3
- spores
  - Armstrong Co.: Rifflemacher, W.E., 1
  - Beaver Co.: Ferm, J.C., 1
  - Western Pennsylvania: Cross, A.T., 2; Sprunk, G.C., 1

- Vertebrata, Southwestern Pennsylvania: Moran, W.E., 1
- Western Pennsylvania
  - Brush Creek Limestone fauna: Hamilton, H.V., 2
  - Cambridge Limestone fauna, popular: Hamilton, H.V., 4
  - fossil zones: Williams, E.G., 3
  - flora: Darrah, W.C., 2

Permian

- Amphibia
  - Greene Co.: Romer, A.S., 3; Vaughan, P.P., 1
  - Southwestern Pennsylvania: Romer, A.S., 2
  - Washington Co.: Romer, A.S., 3
- Ostracoda, Southwestern Pennsylvania: Holland, W.C., 1
- Pisces, Washington Co.: Romer, A.S., 1
- plants
  - Greene Co.: Cross, A.T., 6
  - Southwestern Pennsylvania: Lesquereux, L., 2
  - Washington Co.: Cross, A.T., 6
- Vertebrata, Southwestern Pennsylvania: Moran, W.E., 1

Pleistocene

- Aves, Bedford Co.: Wetmore, A., 1
- Gastropoda, Allegheny Co.: MacMillan, G.K., 1
- Mammalia
  - bears, Pennsylvania: Hay, O.P., 2
  - Blair Co.: Hall, E.R., 1
  - buffalo, Bucks Co.: Rhoads, S.N., 1
  - carnivores, Bedford Co.: Bender, M.S., 1
  - Cumberland Co.: Rafinesque, C.S., 1
  - elephant, Western Pennsylvania: Harlan, R., 1
  - horses, Pennsylvania: Hay, O.P., 2
  - mammoth, Greene Co.: Wells, D., 1
  - mastodon, Greene Co.: Wells, D., 2
  - Montgomery Co.: Hall, E.R., 1; Hibbard, C.W., 1, 2
  - peccary, Bucks Co.: Mercer, H.C., 1
  - puma, Montgomery Co.: Simpson, G.G., 1
  - rhinoceros, Somerset Co.: Featherstonhaugh, G.W., 1
  - tapir, Montgomery Co.: Simpson, G.G., 2
- Pelecypoda, Allegheny Co.: MacMillan, G.K., 1
- plants, Philadelphia Co.: Rafinesque, C.S., 2
- pollen, Chester Co.: Martin, P.S., 2
- Reptile, snake, Blair-Montgomery Cos.: Simpson, G.G., 2

Silurian

- Brachiopoda
  - Bedford Co.: Swartz, C.K., 5
  - Perry-Mifflin-Northumberland Cos.: Cloud, P.E., Jr., 1
- Bryozoa
  - Blair Co.: Swartz, C.K., 5
  - Pennsylvania: Bassler, R.S., 1
- Cystoidea, Bedford-Perry Cos.: Schuchert, C., 3
- Eurypterida, Fulton-Lebanon-Monroe Cos.: O'Connell, M., 1
- fucoids
  - Blair Co.: Becker, H.F., 1
  - Mifflin Co.: Harlan, R., 2, 4
  - Pennsylvania: Goeppert, J.H.R., 2
  - Western Pennsylvania: Harlan, R., 2
- Gastropoda, Bedford Co.: Swartz, C.K., 5
- Invertebrata, Pennsylvania: Swartz, F.M., 11
- Monroe Co., Delaware Water Gap fauna: Willard, B., 1
- Ostracoda
  - Blair Co.: Swartz, C.K., 5
  - Centre Co.: Swartz, F.M., 7; Wainwright, J.E.N., 1
  - Franklin Co.: Swartz, C.K., 5
  - Juniata Co.: Hoskins, D.M., 1; Swartz, C.K., 5
  - Mifflin Co.: Swartz, C.K., 5
  - Pennsylvania: Bassler, R.S., 2
  - Snyder Co.: Hoskins, D.M., 1
- Pisces
  - Monroe Co.: Beerbower, J.R., 2
  - Perry Co.: Eastman, C.R., 2
- plants, Pennsylvania: Goeppert, J.H.R., 3

Triassic

- Amphibia
  - Bucks Co.: Colbert, E.H., 1
  - Chester Co.: Branson, E.B., 1; Colbert, E.H., 1; Cope, E.D., 1, 2
  - Montgomery Co.: Huene, F., von, 2
  - York Co.: Branson, E.B., 1
- Branchiopoda
  - Bucks Co.: Raymond, P.E., 3
  - Chester Co.: Jones, T.R., 1, 4; Raymond, P.E., 3
  - Southeastern Pennsylvania: Bock, W., 4; Jones, T.R., 3
  - York Co.: Raymond, P.E., 3
- Bucks Co. biota: McLaughlin, D.B., 6
- Ostracoda, Chester Co.: Jones, T.R., 1
- Pelecypoda
  - Chester Co.: Britton, N.L., 1
  - Montgomery Co.: Conrad, T.A., 1
- Pisces
  - Bucks Co.: Bock, W., 6, 7
  - Chester Co.: Leidy, J., 1; Schaeffer, B., 2
  - Montgomery Co.: Bock, W., 6; Schaeffer, B., 1, 3

    - Southeastern Pennsylvania, popular: Bock, W., 5
- plants
    - Bucks Co.: Bock, W., 1; Britton, N.L., 1
    - Montgomery Co.: Cook, G.H., 1
    - York Co.: Berry, E.W., 1
- Reptilia
    - Adams Co.: Baird, D., 1
    - Chester Co.: Cope, E.D., 2, 3; McGregor, J.H., 1
    - Lancaster Co.: Price, J.W., Sr., 1
    - Lehigh Co.: Emmons, E., 1; Huene, F., von, 1; McGregor, J.H., 1
    - Montgomery Co.: Cope, E.D., 2
    - Southeastern Pennsylvania: Bock, W., 2
    - York Co.: Baird, D., 1; Cope, E.D., 5
- Southeastern Pennsylvania, vertebrate fauna: Gregory, J.T., 1
- York Co., biota: Wanner, H.E., 1

PALEOZOIC ERA, *see also* individual periods
- Central Pennsylvania: Conlin, R.R., 1
- Eastern Pennsylvania, paleostructural control: Prouty, C.E., 6
- Northeastern Pennsylvania: Woodward, H.P., 6
- Pennsylvania: Ashley, G.H., 2; Eardley, A.J., 1; Grabau, A.W., 4; Hall, J., 3; Hunt, T.S., 1; Kay, G.M., 3, 5; King, P.B., 5; Krynine, P.D., 1; Lebling, C., 2; Maclure, W., 1; Marcou, J., 3; Mazarovich, A.N., 1; Moxon, C., 1; Reeside, J.B., Jr., 2; Richards, H.G., 1; Rogers, H.D., 4, 7; Ruedemann, R., 1, 3; Schuchert, C., 11; Shimer, H.W., 2; Spieker, E.M., 1; Ver Wiebe, W.A., 2, 3; Willard, B., 10; Woodward, H.P., 1, 5, 7, 8
- Western Pennsylvania: Linn, E.H., 2; Lockett, J.R., 1; Swartz, F.M., 4; Ver Wiebe, W.A., 4

PEGMATITES, *see also* Igneous rocks
- Lancaster Co.: Tomlinson, W.H., 2
- Northampton Co.: Virgin, W.W., 1

PELECYPODA, *see also* Mollusca
- Allegheny Co.
    - Pennsylvanian: Doney, H.H., 1
    - Pleistocene: MacMillan, G.K., 1
- Bedford Co., Devonian: Clarke, J.M., 3; Ohern, D.W., 1
- Carbon Co., Pennsylvanian: Davies, J.H., 1
- Chester Co., Triassic: Britton, N.L., 1
- Crawford Co., Devonian: Hall, J., 9
- Cumberland Co., Ordovician: Hall, J., 2
- Luzerne Co., Pennsylvanian: Chow, M.M., 1
- Montgomery Co., Triassic: Conrad, T.A., 1
- Northwestern Pennsylvania, Devonian: Hall, J., 13, 15, 16, 17
- Pennsylvania, Pennsylvanian: Davies, J.H., 1
- Perry Co., Devonian: Rafinesque, C.S., 6
- Southwestern Pennsylvania, Devonian-Mississippian: Rau, J.L., 1
- Sullivan Co., Devonian: Hall, J., 17
- Tioga Co., Devonian: Eller, E.R., 1

PENEPLAINS, *see also* Physiography
- Eastern Pennsylvania: Macar, P., 1
- Pennsylvania: Fenneman, N. M., 3; Johnson, D.W., 1; Rich, J. L., 1
    - Precambrian: Reitz, T.A., de, 1
- Southcentral Pennsylvania: Hickok, W.O., 4th, 1

PENNSYLVANIA, *see also* Pennsylvania-Central, Pennsylvania-Eastern, Pennsylvania-Northeastern, Pennsylvania-Northern, Pennsylvania-Northwestern, Pennsylvania-Southeastern, Pennsylvania-Southwestern, Pennsylvania-Western, and individual counties
- geological literature: Cramer, H.R., 5
- history: Merrill, G.P., 1
- publicity: Willard, B., 7
- teaching elementary geology: Dort, W., Jr., 1
- temperature gradients: Spicer, H.C., 1
- topographic control of population: Bechdolt, A.F., 1
- well records: Fuller, M.L., 1, 2

Areal geology
- Pennsylvania: Blackwelder, E., 1; Darby, W., 1; Daubeny, C., 1; Fearon, H.B., 1; Hinton, J.H., 1; Marcou, J., 2; Mazarovich, A.N., 1; Melish, J., 1; Moxon, C., 1; Rogers, H.D., 2; Shottenlocher, R., 1; Scott, J., 1; Willard, B., 14

Economic geology
- carbon-ratio theory: Reeves, F., 2
- coal: Bell, I.L., 1, 2; Campbell, M.R., 2; Clark, W.B., 3; Eavanson, H.N., 2; Rogers, H.D., 8; Schanz, J.J., Jr., 2; Snyder, N.H., 2; Strueve, H., 1; Theissen, R., 2; Wanless, H.R., 2; Wetherill, C.M., 1
    - analysis: Aresco, S.J., 1, 2, 3, 4, 5, 6, 7, 8; Fieldner, A.C., 1, 3, 5; Parker, E.W., 1; Pope, G.S., 2
    - history: Robinson, C.W., 1

    - origin: Gresley, W.S., 3; Plotts, W., 1; Rafinesque, C.S., 2; White, C.D., 3
    - relation to petroleum: Lilley, E.R., 1
    - reserves: Crichten, A.B., 1; Heald, K.C., 1; U. S. Geol. Survey, 1
  - fire clay: Greaves-Walker, A.F., 1
  - gems: Schlegel, D.M., 1
  - industrial minerals, 1951: Stephenson, R.C., 2
  - iron: Bell, I.L., 1, 2; Eckel, E.C., 2; Einecke, G., 1; Hopkins, T.C., 4; Pumpelly, R., 1; Wetherill, C.M., 1
  - limestone: Stone, R.W., 5; Wetherill, C.M., 1
  - manganese: Chase, L.R., 1; Hoffman, J.N., 2
  - mineral resources: Dieffenbach, O., 2; Greenwald, H.P., 1; Marcou, J., 2; Plotts, W., 1; Sanford, S., 1; Schanz, J.J., Jr., 1; Schroder, F.C., 1; Stephenson, R.C., 1; Wyer, S.S., 1
    - metal: Gault, H.R., 1
  - natural gas: Swartz, F.M., 3
    - reserves: U. S. Geol. Survey, 1
  - oil shale, reserves: Heald, K.C., 1
  - petroleum: Swartz, F.M., 3; White, I.C., 7
    - history: Murray, D., 2
    - relation to coal: Lilley, E.R., 1
    - reserves: Lytle, W.S., 4; U. S. Geol. Survey, 1
    - underground storage: Fettke, C.R., 54
  - petroleum and natural gas, coal moisture correlation: Gibbs, H.S., 1
  - radioactive minerals: Cooper, M., 1; Klemic, H., 4; Nelson, J.M., 1
  - salt: Griggs, R.L., 1
  - silica: Taylor, T.G., 1
  - stone: Bowles, O., 1; Eckel, E.C., 1
  - uranium: Bolger, R.C., 7; McCauley, J.F., 2

- *Engineering geology*
  - highway engineering, geologic aids: Gray, C., 11
  - underground petroleum storage: Fettke, C.R., 54
- *Geochemical investigations*
  - trace elements in coal: Stadnichenko, T.M., 1, 2
- *Geophysical investigations*
  - electrical resistivity, Pennsylvania Turnpike: Scharon, H.L., 1
  - gravity: Hammer, S., 1; Logue, L.L., 1; Woollard, G. P., 1
  - seismic reflection: Lyons, P.L., 1
- *Ground water*
  - Pennsylvania: Graham, J.B., 3; Lohman, S.W., 1; Lytle, W.S., 11; Meinzer, O.E., 1, 3
    - levels: Graham, J.B., 1; Sundstrom, R.W., 1
    - principles: Dort, W., Jr., 3
    - problems: Cathcart, S.H., 4
  - springs
    - analyses: Bell, J., 1
    - mineral: Crook, J.K., 1; Peale, A.C., 1
    - temperatures: Mangan, J.W., 1
- *Historical geology*
  - Cambrian: Resser, C.E., 3
  - Cambrian-Ordovician: Swartz, F.M., 3
  - Cretaceous: Levorsen, A.I., 1
  - Devonian: Jones, T.H., 2; Miller, J.T., 3; Schmidt, H., 1; Schuchert, C., 2, 5, 6; Sutton, R.G., 1
    - Marcellus Shale: Rich, J.L., 3
  - Mississippian: Levorsen, A.I., 1
    - Pocono Formation: Pelletier, B.R., 1
  - Mississippian-Pennsylvanian floral zones: Jongmans, W.J., 1
  - Ordovician: Kay, G.M., 1; Twenhofel, W.H., 2
    - paleocurrents: Yeakel, L., 2
  - Ordovician-Devonian: Swartz, F.M., 1
  - Ordovician-Permian, continental deposits: Willard, B., 6
  - Paleozoic: Ashley, G.H., 2; Grabau, A.W., 4; Kay, G.M., 3, 5; Krynine, P.D., 1; Marcou, J., 3; Mazarovich, A.N., 1; Moxon, C., 1; Oil and Gas Jour., 1; Reeside, J.B., Jr., 2; Rogers, H.D., 4, 7; Ruedemann, R., 1, 3; Schuchert, C., 11; Shimer, H.W., 2; Spieker, E.M., 1; Ver Wiebe, W.A., 2, 3; Woodward, H.P., 1, 5, 7, 8, 9
  - Paleozoic-Recent: Lebling, C., 2
  - Pennsylvanian: Ashley, G.H., 1; Bertrand, P., 1; Bode, H., 1; Clark, W.B., 2; Dannenberg, A., 1; Levorsen, A.I., 1; Mitchum, R.M., Jr., 1; Trueman, A.E., 1; Wanless, H.R., 1, 4, 5
    - drainage patterns: Friedman, S.A., 1
    - floral zones: Darrah, W.C., 3
  - Pleistocene: Dillon, L.S., 1; Martin, P.S., 1; Reeside, J.B., Jr., 2
  - Precambrian: Moss, R.G., 1
  - Precambrian-Paleozoic: Hunt, T.S., 1; Maclure, W., 1
  - Precambrian-Recent: Eardley, A.J., 1; Hall, J., 3; King, P.B., 5; Richards, H.G., 1
  - Silurian: Alling, H.L., 1; Amsden, T.W., 1; Grabau, A.W., 2
    - paleocurrents: Yeakel, L., 2

- Silurian-Devonian: Hall, J., 11; Reeside, J.B., Jr., 1
- Tertiary: Matthew, W.D., 1

Maps

- economic
  - coal reserves: Anonymous, 20
  - mineral resources: Evans, L., 3; Sheafer, P.W., 2; Wyer, S.S., 1
  - salt: Fettke, C.R., 54
  - uranium: Schnabel, R.W., 2
- geologic: Anonymous, 5; Beaujour, L.A.F., de, 1; Bradley, F.H., 1; Cleaveland, P., 1; Hitchcock, C.H., 1, 2; Hitchcock, E., 2; McGee, WJ, 1; Maclure, W., 1; Marcou, J., 1; Moxon, C., 1; Rogers, H.D., 6; Willis, B., 2
  - history: Willard, B., 4
  - index: Boardman, L., 1
- geophysical
  - gravity anomalies: Hammer, S., 1; Logue, L.L., 1
  - seismic reflection: Lyons, P.L., 1
- isopach
  - Devonian: Jones, T.H., 2
  - Silurian: Amsden, T.W., 1
- lithofacies
  - Devonian: Jones, T.H., 2; Sutton, R.G., 1
  - Silurian: Amsden, T.W., 1
- major faunal elements, Silurian: Amsden, T.W., 1
- paleogeographic
  - Devonian: Schuchert, C., 5
  - Paleozoic: Schuchert, C., 11
  - Tertiary: Matthew, W.D., 1
- paleogeologic
  - Cretaceous: Levorsen, A.I., 1
  - Mississippian: Levorsen, A.I., 1
  - Pennsylvanian: Levorsen, A.I., 1
- physiographic: Evans, L., 2, 3; Guettard, J., 1; Kalm, P., 1; Lobeck, A.K., 1, 2, 3, 4; Raisz, E.J., 1, 2
  - eolian deposits: Natl. Research Council, 1
  - glacial border: Chamberlin, T.C., 3
  - glacial geology: Flint, R.F., 2
  - physiographic divisions: Fenneman, N.M., 2
- structure: King, P.B., 2; Thom, W.T., Jr., 4
- structure contour
  - Precambrian surface: Moss, R.G., 1; Thom, W.T., Jr., 4
  - salt: Fettke, C.R., 54

Mineralogy

- aragonite: White, W.B., 3
- calcite: White, W.B., 3
- cave minerals: White, W.B., 3
- electron photomicrographs: Bates, T.F., 3
- gems: Schlegel, D.M., 1
- gypsum: White, W.B., 3
- limonite: White, W.B., 3
- mineral collecting: Lapham, D.M., 4
- mineralogy teaching: Thornton, C.P., 1
- minerals, analyses: Clarke, F.W., 8
- soils: Jeffries, C.D., 1

Paleontology

- algae, Paleozoic: Fenton, C.L., 1
- Anthozoa, Ordovician-Devonian: Bassler, R.S., 4
- Brachiopoda, Ordovician: Cooper, G.A., 5
- Bryozoa, Silurian: Bassler, R.S., 1
- Devonian type specimens: Wagner Free Inst. Science, 1
- Eurypterida, Devonian: Beecher, C.E., 1
- fucoids, Silurian: Goeppert, J.H.R., 2
- Invertebrata
  - Devonian: Swartz, F.M., 10
  - Paleozoic: Grabau, A.W., 1; Shimer, H.W., 4
  - Silurian: Swartz, F.M., 11
- Mississippian-Pennsylvanian floral zones: Jongmans, W.J., 1
- Ostracoda, Ordovician, Silurian, Devonian: Bassler, R.S., 2
- Pelecypoda, Pennsylvanian: Davies, J.H., 1
- Pennsylvanian floral zones: Bertrand, P., 1; Bode, H., 1; Darrah, W.C., 2
- Pisces, Paleozoic: Newberry, J.S., 4
- plants
  - Devonian: Goeppert, J.H.R., 3
  - Devonian-Mississippian: Arnold, C.A., 1
  - Mississippian: Goeppert, J.H.R., 3
    - Pocono Formation: Read, C.B., 1
  - Paleozoic: Schimper, W.P., 1
  - Pennsylvanian: Abbott, M.L., 2; Goeppert, J.H.R., 1; Sternberg, K.M., 1
  - Pennsylvanian-Permian: Lesquereux, L., 2
  - Silurian: Goeppert, J.H.R., 3
- Trilobita
  - Devonian: Delo, D.M., 1; Hall, J., 5
  - Mississippian: Weller, J.M., 1

Petrology

- anthraxolite: Dietrich, R.V., 1
- clay in rocks: Griffiths, J.C., 4
- coal: Channabasappa, K.C., 1; Fuchs, W., 1; McCartney, J.T., 1
  - carbonization: White, C.D., 5
  - trace elements: Stadnichenko, T.M., 1
- graywacke: Krynine, P.D., 2
- Oriskany Sandstone: Rosenfeld, M.A., 3

Pocono Formation
- paleocurrents: Pelletier, B.R., 1
- petrographic variability: Emery, J.R., 1

reservoir rocks: Griffiths, J.C., 7; Laver, A.W., 1
rocks, analyses: Clarke, F.W., 8
sandstone
- directional permeabilities: Hutta, J.J., 1
- fabric: Hutta, J.J., 2
- porosity: Griffiths, J.C., 2

shale: Sutton, W.H., 1

Physical geology

Appalachian Mountains: Hunt, T.S., 1; Lombard, A.E., 1; Rich, J.L., 2; Rogers, H.D., 5; Woodward, H.P., 1
crustal thickness: Ewing, W.M., 1
earthquakes: Heck, N.H., 1, 3
joints: Heck, E. T., 1
major structural features: Parejas, E., 1
overthrust faults: Willis, B., 1
Precambrian surface: Moss, R.G., 1
- deformation: Reitz, T.A., de, 1

soil erosion: Patrick, A.L., 1
structural geology: Eardley, A.J., 1; King, P.B., 1; Ruedemann, R., 2; Stille, H., 1; Woodward, H.P., 7
structural history: King, P.B., 4
tectonic divisions: Eardley, A.J., 2

Physiographic geology

Appalachian Mountains: Rafinesque, C.S., 4, 7
- relief: Béthune, P.F., de, 2

caves: Davies, W.E., 1; Davis, W.M., 4; Parker, J.D., 2; Stone, R.W., 4, 6
- commercial: Stone, R.W., 3

drainage patterns: Davis, W.M., 1; Meyerhoff, H.A., 1
elevations: Sangree, A., 1
erosion appearance, popular: Davis, W.M., 5
glacial border: Pittelkow, J., 1
glacial geology: Antevs, E.V., 2
- popular: Newberry, J.S., 3

landforms: Raisz, E.J., 1
peneplains: Fenneman, N.M., 3; Johnson, D.W., 1; Rich, J.L., 1
Pennsylvania: Béthune, P.F., de, 1; Bowman, I., 1; Kalm, P., 1; Lobeck, A.K., 3; Pownall, T., 1; Rogers, H.D., 8; White, G.W., 1
physiographic provinces: Fenneman, N.M., 1, 2
sea level changes: Stevens, R.P., 1
stream development: Strahler, A.N., 1
topographic control of population: Bechdolt, A.F., 1; Myers, R.E., 4

PENNSYLVANIA-CENTRAL, *see also* Pennsylvania, Pennsylvania-Southcentral, and Pennsylvania-Northern

Areal geology

Seven Mountains area: Thamm, J.K., Jr., 1

Economic geology

clay: Griffiths, J.C.. 8
coal, bituminous, analyses: Kirgis, F.L., 1
copper-uranium deposits: Brummer, J.J., 1
fire clay, origin: Bolger, R.C., 2

Geophysical investigations

aeromagnetic survey: Vacquier, V., 1
electrical resistivity: Ansari, A.M.A., 1; Gross, G.W., 1
gamma ray log analyses, Devonian: Kardos, W.G., 1
gravity: Bacon, L.O., 1; Howell, B.F., Jr., 3
self-potential, Gatesburg Formation residuum: Gross, G.W., 2

Ground water

springs: Turner, T.D., 4

Historical geology

Cambrian: Wilson, J.L., 2
- biostratigraphy: Balk, C.L., 1
- Conococheague Limestone: Long, M.B., 1

Cambrian-Pennsylvanian: Willard, B., 17
Cambrian-Pleistocene: Conlin, R.R., 1
Devonian: Linn, E.H., 1
Ordovician: Donaldson, A.C., 1; Field, R.M., 1; Swain, F.M., Jr., 1
- Axemann Limestone: Macauley, G.R., 1
- Larke Dolomite: Prouty, C.E., 3

Ordovician-Mississippian: Swartz, F.M., 5
Ordovician-Silurian: Bergenback, R.E., 1

Maps

aeromagnetic, Clearfield-Curwensville-Phillipsburg area: Vacquier, V., 1

Mineralogy

clay: Weaver, C.E., 3

Paleontology

Brachiopoda
- Cambrian: Tasch, P., 4
- Devonian: Percival, S.F., 1

Mollusca, Devonian: Percival, S.F., 1
Ostracoda
- Devonian: Swartz, F.M., 7
- Silurian: Swartz, F.M., 7; Wainwright, J.E.N., 1

Stelleroidea, Devonian: Schuchert, C., 7
Tentaculitida, Devonian: Percival, S.F., 1

  - Trilobita, Cambrian: Balk, C.L., 1; Tasch, P., 4; Wilson, J.L., 1
  - Warrior Formation, Cambrian: Tasch, P., 1, 4
- *Petrology*
  - bentonite: Weaver, C.E., 1, 2, 5
  - chert, Ordovician: Folk, R.L., 2
  - clay: Weaver, C.E., 1, 2, 3
  - dolomite: Krynine, P.D., 4; Rieg, L.E., 1
  - oolites, Cambro-Ordovician: MacPherson, L.A., 1
  - Ordovician carbonate rocks: Rones, M., 1
  - Oriskany Sandstone, Devonian: Ingram, R.J., 1
  - porosity: Rosenfeld, M.A., 1, 2
  - quartzite: Krynine, P.D., 3; Wood, G.V., 1
  - silica, Beekmantown Group: Folk, R.L., 1
  - Silurian clastic rocks: Bergenback, R.E., 1
- *Physical geology*
  - anomalous dips: Dort, W., Jr., 2
  - faults
    - Appalachian Front: Dort, W., Jr., 4
    - Appalachian Mountains: Rodgers, J., 2
  - folds
    - Appalachian Foreland: Ebright, J.R., 1
    - Appalachian Mountains: Rodgers, J., 2
  - loess, Susquehanna River Valley: Higbee, H.W., 1
  - structural transition: Decker, R.W., 1
- *Physiographic geology*
  - caves; DeVitt, W., 3d, 2; Haas, J., 3
  - drainage patterns: Brush, L.M., Jr., 1, 2
  - flood plain cross section: Lattman, L.H., 2
  - terraces, Susquehanna River: Kauffman, M.E., 1; Peltier, L.C., 1

PENNSYLVANIA-EASTERN, *see also* Pennsylvania, Pennsylvania-Northeastern, and Pennsylvania-Southeastern

- *Areal geology*
  - Easton area: Dyson, J.L., 1
- *Economic geology*
  - glass sand: Fettke, C.R., 1
  - oil shale: Schweinfurth, S.P., 1
  - radioactive minerals, Silurian: Schnabel, R.W., 1
  - uranium: Kaiser, E.P., 1
- *Engineering geology*
  - tunnel shafts, cores: Ash, S.H., 3
- *Historical geology*
  - Cambrian-Pleistocene: Dyson, J.L., 2
  - Cambrian-Silurian: Hunt, T.S., 3
  - Devonian: Willard, B., 8
  - Jurassic: Thom, W.T., Jr., 1
  - Ordovician-Pennsylvanian: Arndt, H.H., 1
  - Ordovician-Silurian: Bergenback, R.E., 1; Moseley, J.R., 1
  - Paleozoic, paleostructural control: Prouty, C.E., 6
  - Pleistocene: Flint, R.F., 1
  - Precambrian-Pleistocene: Willard, B., 10
  - Silurian, Shawangunk Grit: Billingsley, P., 1
- *Maps*
  - geologic: Arndt, H.H., 1
  - physiographic: Evans, L., 1
- *Mineralogy*
  - mineral collecting, popular: Myers, R.E., 1
- *Paleontology*
  - Anthozoa, Ordovician: Okulitch, V.J., 1
  - Fauna, Lower Paleozoic: Sharpe, D., 1
  - Mammalia
    - bears, Pleistocene: Hay, O.P., 2
    - horses, Pleistocene: Hay, O.P., 2
- *Petrology*
  - Jacksonburg Formation, Ordovician: Ray, S.B., 1
  - Silurian clastic rocks: Bergenback, R.E., 1
- *Physiographic geology*
  - glacial geology: Chamberlin, T.C., 2
  - partial planation: Macar, P., 1
  - transverse drainage: Carlston, C.W., 1

PENNSYLVANIA-NORTHEASTERN, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northern

- *Economic geology*
  - coal, anthracite: Ashley, G.H., 5; Ashmead, D.C., 1; Jones, J.F., 1; Roberts, W.F., 9; Sheafer, P.W., 4; Stoek, H.H., 1
    - analysis: Cooper, H.M., 1
    - origin: Keyes, C.R., 1
    - reserves: Ash, S.H., 2; Rothrock, H.E., 1
  - copper: Lesley, J.P., 2
  - natural gas: Willard, B., 5
  - petroleum: Willard, B., 5
  - radioactive minerals: Welch, S.W., 1
  - uranium: McCauley, J.F., 1
- *Engineering geology*
  - ground water seepage: Ash, S.H., 4
  - mine-drainage tunnel: Ash, S.H., 5
  - turnpike construction: Shurig, D.G., 1

Historical geology
Cambrian-Devonian: Johnson, M.E., 4
Devonian: McGucken, J.G., 1
Honesdale Sandstone: Reed, E.W,. 1
Schoharie Formation: Johnsen, J.H., 1
Mississippian, Pocono Sandstone: Leonard, A.D., 1
Ordovician-Permian: Arndt, H.H., 1; Willard, B., 5
Paleozoic-Triassic: Woodward, H.P., 6
Pennsylvanian: Ashley, G.H., 5; Ashmead, D.C., 1
Pottsville Formation: Wood, G.H., Jr., 1
Maps
geologic: Arndt, H.H., 1
Mineralogy
clay: Tedrow, J.C.F., 2
Paleontology
plants, Pennsylvanian: Bailey, J.W., 1; Teschemacher, J.E., 1
Petrology
coal, anthracite: Fanshawe, J.R., 1; Turner, H.G., 1, 2, 3; Wagner, H.C., 1
Physical geology
concretions, Pennsylvanian: Gresley, W.S., 1
structural geology: Woodward, H.P., 6
anthracite region: Wood, G.H., Jr., 3
Pocono Plateau: Wagner, N.S., 1
sun-cracked limestone, Devonian: Chadwick, G.H., 6
weathering, glacial till: Tedrow, J.C.F., 1
Physiographic geology
drift mounds: Corss, F., 1
glacial geology: Heilprin, A., 1
Wyoming-Lackawanna region: Itter, H.A., 1

PENNSYLVANIA-NORTHERN, *see also* Pennsylvania, Pennsylvania-Northeastern, and Pennsylvania-Northwestern
Economic geology
natural gas: Fettke, C.R., 36; Ingham, A.I., 1
petroleum: Fettke, C.R., 36
Geophysical investigations
gravity: Vozoff, K., 1
Historical geology
Cambrian-Devonian: Fettke, C.R., 34
Devonian: Chadwick, G.H., 5; Williams, H.S., 1
Maps
economic, gas fields: Ingham, A.I., 1
physiographic
glacial boundary: Antevs, E.V., 1
restored upland contours: Denny, C.S., 3
structure: Fettke, C.R., 48
gas fields: Ingham, A.I., 1
structure contour, Oriskany Sandstone: Fettke, C.R., 48
Paleontology
Brachiopoda, Devonian: Hall, J., 21, 22
Pisces, Devonian: Eastman, C.R., 2; Newberry, J.S., 2
Petrology
alluvium: Millette, J.F.G., 1
Bradford Sandstone, grain orientation: Griffiths, J.C., 3, 5
loess: Millette, J.F.G., 1
Mercer fire clay, analysis: Bolger, R.C., 1
permeability in sandstones: Johnson, W.E.,1
sandstone, grain orientation: Griffiths, J.C., 1
Physical geology
post glacial uplift: Fairchild, H.L., 3
Physiographic geology
glacial geology: Denny, C.S., 2; MacClintock, P., 1
glacial striae: Chamberlin, T.C., 1; Lewis, H.C., 3

PENNSYLVANIA-NORTHWESTERN, *see also* Pennsylvania, Pennsylvania-Northern, and Pennsylvania-Western
weathering of till: Droste, J.B., 1
Economic geology
clay: Shepps, V.C., 3
natural gas: Cathcart, S.H., 1
petroleum: Cathcart, S.H., 1, 2; Giddens, P.H., 1; Lytle, W.S., 13; Small, W.M., 1
sand and gravel: Shepps, V.C., 3
Ground water
Northwestern Pennsylvania: Shepps, V.C., 3
Historical geology
Cambrian: Cathcart, S.H., 2
Cambrian-Ordovician: Linn, E.H., 3
Devonian: Chadwick, G.H., 2, 3; Greiner, H., 1; Wright, W., 1
Devonian-Mississippian: Tesmer, I.H., 1
Devonian-Pennsylvanian: Lytle, W.S., 13
Mississippian: Szmuc, E.J., 1
Pleistocene: Hough, J.L., 2
Maps
economic, petroleum: Plumb, H.S., 1; Root, Anthony and Co., 1
physiographic, glacial geology: Shepps, V.C., 3

- structure contour, Corry Sandstone, Mississippian: Cathcart, S.H., 1
- *Paleontology*
  - Brachiopoda
    - Devonian: Cooper, G.A., 3; Greiner, H., 1
    - Devonian-Mississippian: Holland, F.D., Jr., 1
    - Mississippian: Hall, J., 21
  - conodonts, Devonian: Hass, W.H., 1, 2
  - Porifera, Devonian-Mississippian: Caster, K.E., 4
- *Petrology*
  - glacial till: Droste, J.B., 3, 5; Sitler, R.F., 3
  - oil-bearing sandstones, porosity: Melcher, A.F., 1
- *Physical geology*
  - movement, Lake Erie: Moore, S., 1
- *Physiographic geology*
  - glacial geology: Deeley, R.M., 1; Leverett, F., 2; Shepps, V.C., 1, 3, 4; Sitler, R.F., 2; White, G.W., 2
  - glacial lakes: Hough, J.L., 2; Taylor, F.B., 1
  - oil regions: Wright, W., 1

PENNSYLVANIA-SOUTHCENTRAL, *see also* Pennsylvania and Pennsylvania-Central
- *Historical geology*
  - Ordovician: Cooper, G.A., 4; Craig, L.C., 1; Field, R.M., 1
    - Stones River Group: Prouty, C.E., 4
- *Petrology*
  - Huntsville Limestone, insoluble residues: Messineo, A.V., 1
  - Stones River Limestone, insoluble residues: Messineo, A.V., 1
- *Physiographic geology*
  - erosion surfaces: Hickok, W.O., 4th, 1
  - stream asymmetry: Broscoe, A.J., 1

PENNSYLVANIA-SOUTHEASTERN, *see also* Pennsylvania and Pennsylvania-Eastern
- *Areal geology*
  - Southeastern Pennsylvania: Bowen, E., 2; Frazer, P., Jr., 3
    - Delaware Valley: Hamilton, S.H., 1
    - Lehigh Valley: Hills, J.M., 1
- *Economic geology*
  - cement: Miller, B.L., 2
  - corundum: Pearre, N.C., 1
  - feldspar: Hopkins, T.C., 2
  - iron, Blue Ridge area: Foose, R.M., 5
  - limestone: Prouty, C.E., 7
  - mineral resources, Delaware Valley: Richards, H.G., 2
- *Geophysical investigations*
  - aeromagnetic
    - iron: Jensen, H., 1
    - Martic Line: Griscom, A., 1
    - Reading Prong: Bromery, R.W., 20
    - Triassic structure: Zietz, I., 1
  - magnetic, diabase: Socolow, A.A., 20
- *Ground water*
  - temperature-movement relations: Foose, R.M.,3
- *Historical geology*
  - Cambrian: Howell, B.F., Sr., 2, 4; Willard, B., 13
    - Annville Limestone: Prouty, C.E., 1
  - Cambrian-Ordovician: Geyer, A.R., 2; Gray, C., 9; Hunt, T.S., 2; Kobayashi, T., 1
  - Ordovician: Gray, C., 4; Hobson, J.P., Jr., 3; Prouty, C.E., 7; Willard, B., 18
    - Annville Limestone: Prouty, C.E., 1
    - Leesport Limestone: Prouty, C.E., 1
  - Permian: Lyman, B.S., 2
  - Pleistocene, Delaware Valley deposit: Lewis, H.C., 2
  - Precambrian: Buckwalter, T.V., Jr., 3; Montgomery, A., 2
    - Baltimore Gneiss: Davis, G.L., 1
  - Precambrian-Pleistocene, Delaware Valley: Richards, H.G., 2
  - Precambrian-Silurian: Mathews, E.B., 1
  - Precambrian-Triassic: Rodgers, J., 1
  - Triassic: Bain, G.W., 1; Bock, W., 2, 6; Dana, J.D., 3; Finch, J., 1; Gregory, J.T., 1; Kummel, H.B., 1; Lebling, C., 1; Lyman, B.S., 2; McKee, E.D., 1; McLaughlin, D.B., 1, 3; Reeside, J.B., Jr., 3; Rogers, W.B., 2; Shimer, H.W., 2; Willard, B., 15
    - Lockatong Formation: Van Houten, F.B., 1
    - Stockton Formation: Dellwig, L.F., 1
    - vertex monoclines: Bock, W., 3
- *Maps*
  - geologic: Frazer, P., Jr., 3
    - Triassic: McKee, E.D., 1
  - isopach, Triassic: McKee, E.D., 1
  - lithofacies, Triassic: McKee, E.D., 1
  - paleogeologic, Triassic: McKee, E.D., 1
- *Mineralogy*
  - clinopyroxenes: Norton, D.A., 1, 2
  - corundum: Pearre, N.C., 1
  - gems: Hamlin, A.C., 1; Kunz, G.F., 1; Sinkankas, J., 1
  - mica: Lewis, H.C., 1
  - mineral analyses: Clarke, F.W., 6; Wells, R.C., 1
  - serpentine: Bates, T.F., 1

Paleontology
paleobotany, Triassic: Knowlton, F.H., 2
Pisces, Triassic, popular: Bock, W., 5
Reptiles, Triassic: Bock, W., 2
worm, Cambrian: Goeppert, J.H.R., 2
Petrology
anorthosite: Smith, I.F., 1
diabase, Triassic: Darton, N.H., 1
granophyre-bearing diabase: Hotz, P.E., 2
heavy minerals, Lower Cretaceous: McCollum, J., 1
igneous rocks, analysis: Washington, H.S., 2; Wells, R.C., 1
Jacksonburg Formation, Ordovician: Warmkessel, C.A., 1
metamorphic rocks, analyses: Wells, R.C., 1
structural petrology: Cloos, E., 2
uranium, Triassic: Walthier, T.N., 1
Physical geology
Blue Ridge structure: Cloos, E., 5; White, W.A., 1
diabase forms: Hotz, P.E., 3
faulting, Triassic: Bain, G.W., 1
nappes: Gray, C., 14
structural geology: King, B.C., 1
Triassic Basin: McLaughlin, D.B., 3
Triassic structure: Zietz, I., 1
Physiographic geology
Brandywine Creek, channel features: Wolman, M.G., 1, 2
caves: Smeltzer, B.L., 3
diabase terrane: Myers, R.E., 5
glacial geology: Bassler, H., 1
gravel, geomorphic value: Campbell, M.R., 9

PENNSYLVANIA-SOUTHWESTERN, *see also* Pennsylvania and Pennsylvania-Western
connate water: Reeves, F., 1
Economic geology
coal, bituminous: Cross, A.T., 4; Martin, G.C., 1; Swartz, C.K., 2, 3
Pittsburgh Coal: Eavanson, H.N., 1
limestone: Ames, J.A., 2
Ground water
Ohio River Basin: Meinzer, O.E., 2
Historical geology
Devonian, bentonite: Flowers, R.R., 1
Mississippian: Swales, W.E., 1; Wray, J.L., 1
Pocono Formation: Dodson, C.L., 1
Mississippian-Permian: Stevenson, J.J., 1
Pennsylvanian: Swartz, C.K., 2, 3
Pittsburgh Coal: Cross, A.T., 4, 7
Pennsylvanian-Permian: Cross, A.T., 5; Darrah, W.C., 1; Martin, G.C., 1; Moore, R.C., 1; Moran, W.E., 1
Permian: Case, E.C., 2; Cross, A.T., 3; Martin, W.D., 1; White, C.D., 7
floral zones: Darrah, W.C., 3
Maps
economic, coal, bituminous: Murphy, R.E., 1
Pittsburgh Coal: Eavanson, H.N., 1
Paleontology
Amphibia, Pennsylvanian-Permian: Romer, A.S., 2
Foraminifera, Mississippian: Wray, J.L., 2
Ostracoda, Permian: Holland, W.C., 1
Pelecypoda, Devonian-Mississippian: Rau, J.L., 1
plants, Pennsylvanian: Miklausen, A.J., 1
Vertebrata, Pennsylvanian-Permian: Moran, W.E., 1
Petrology
Lower Kittanning Coal: Shapiro, N., 1
Physical geology
erosion: Glenn, L.C., 1
joints: Hough, van N.D., 1
Physiographic geology
abandoned channels: Campbell, M.R., 1
glacial geology, Ohio River: White, I.C., 3
Ohio River area: Hutchins, T., 1
Pittsburgh River, Pleistocene: Stout, W.E., 2
terraces, Monongahela River: Brown, S.B., 1

PENNSYLVANIA-WESTERN, *see also* Pennsylvania, Pennsylvania-Northwestern, and Pennsylvania-Southwestern
well logs: Wagner, W.R., 4
Areal geology
Western Pennsylvania: Featherstonhaugh, G.W., 2
Economic geology
clay: Williams, E.G., 5
coal, bituminous: Anonymous, 3; Ashley, G.H., 4; Deasy, G.F., 2, 3; Fearon, H.B., 1; Johnston, J.K., 1; Snyder, N.H., 1; Young, W.H., 1
analyses: Campbell, M.R., 6; Fieldner, A.C., 2; Harr, L., 1; Pope, G.S., 1
names: Anonymous, 41
reserves: Ashley, G.H., 6
fireclay: Hopkins, T.C., 1
natural gas: Bownocker, J.A., 1; Cathcart, S.H., 5; Fettke, C.R., 2, 3, 4, 5, 28, 38, 40, 42, 44, 46, 50, 51, 53, 55; Lafferty, R.C., 1; Lytle, W.S., 5, 7, 9; Myers, T.H., 1; Pa. Geol. Survey, 2; Rittenhouse, G., 1; Robinson, J.F., 1; White, I.C., 5; Woodward, H.P., 5

    - helium content: Anderson, C.C., 1; Boone, W.J., Jr., 1
  - oil shale: Jilison, W.R., 1
  - petroleum: Arnold, R., 1; Bonine, C.A., 1; Cathcart, S.H., 5; Clapp, F.G., 1; Dana, F.F., 1; Dickey, P.A., 2; Emmons, W.H., 1; Fettke, C.R., 2, 3, 4, 5, 28, 38, 40, 42, 44, 46, 50, 51, 53, 55; Hoeffer, H., 1; Lafferty, R.C., 1; Linn, E.H., 2; Lytle, W.S., 5, 7, 9; Mabery, C.F., 2; Miser, H.D., 2; Myers, T.H,. 1; Pa. Geol. Survey, 2; Powers, S., 1; Redfield, A.H., 1; Rigaud, F., 1; Rittenhouse, G., 1; Rogers, H.D., 9; Thomas, J.M., 1; Ver Wiebe, W.A., 1, 4; Willard, B., 14; Woodward, H.P., 2, 3, 4, 5, 8, 9
    - analyses: Lane, E.C., 1; Mabery, C.F., 1
    - historical survey: Campbell, M.R., 3
    - reserves: Lytle, W.S., 1; Pratt, W.E., 1; White, C.D., 4
  - radioactive minerals, coal: Patterson, E.D., 1
  - salt: Ames, J.A., 1; Fettke, C.R., 52; Krumbein, W.C., 1

Engineering geology
  - Pennsylvania Turnpike: Cleaves, A.B., 2

Geochemical investigations
  - trace elements: Degens, E.T., 1, 2

Ground water
  - analysis: Mills, R. van A., 1

Historical geology
  - Cambrian-Pennsylvanian: Robinson, J.F., 1
  - Cambrian-Silurian: Rogers, D., Jr., 1
  - Devonian: Murphy, A.E., 1
    - bentonite: Fettke, C.R., 41
  - Devonian-Pennsylvanian: Lytle, W.S., 2
  - Mississippian, Bedford-Berea Formations: Pepper. J.F., 1
  - Ordovician-Pennsylvanian: Fettke, C.R., 42
  - Paleozoic: Fettke, C.R., 55; Linn, E.H., 2; Lockett, J.R., 1; Swartz, F.M., 4; Ver Wiebe, W.A., 4
  - Pennsylvanian: Andrews, E.B., 1; Dutcher, R.R., 1; Fieldner, A.C., 5; Prouty, C.E., 5; Renick, B.C., 1; Wanless, H.R., 3
    - flora: Darrah, W.C., 2
    - fossil zones: Williams, E.G., 3
    - Mercer Limestone: Mark, C.G., 1
  - Pennsylvanian-Permian: Johnston,, J.K. 1
  - Silurian: Rittenhouse, G., 1
    - evaporites: Krumbein, W.C., 1

Maps
  - economic
    - coal, bituminous: Deasy, G.F., 1, 2; Halberstadt, B., 1
    - deep-well locations: Everhart, G.M., 1
    - petroleum: Smith, H.J., 1
    - oil and gas fields: Coe, A.C., 1; Cohee, G.V., 1; Fettke, C.R., 55; Jones, T.H., 1; Pa. Geol. Survey, 2
    - salt: Fettke, C.R., 52
  - geologic, Mississippian sandstone formations: Pepper, J.F., 1
  - isopach, Corry Sandstone, Mississippian: Pepper, J.F., 1
  - paleogeographic
    - Mississippian: Pepper, J.F., 1
    - Pennsylvanian: Williams, E.G., 4
  - structure: Fettke, C.R., 48
  - structure contour, Oriskany Sandstone: Fettke, C.R., 48

Mineralogy
  - siderite: Rogers, W.B., 1

Paleontology
  - Amphibia, Pennsylvanian: Cope, E.D., 1
  - Anthozoa, Pennsylvanian: Bassler, R.S., 4
  - Brush Creek Limestone fauna, Pennsylvanian: Hamilton, H.V., 2
  - Cambridge Limestone fauna, Pennsylvanian, popular: Hamilton, H.V., 4
  - fucoid, Silurian: Harlan, R., 2
  - Mammalia, elephant, Pleistocene: Harlan, R., 1
  - Nautiloidea, Pennsylvanian: Unklesbay, A.G., 1
  - Ostracoda, Conemaugh Formation, Pennsylvanian: Gillespie, R.F., 1
  - plants, microfossil assemblages, Pennsylvanian: Denton, G.H., 1
  - spores, Pennsylvanian: Cross, A.T., 2; Sprunk, G.C., 1

Petrology
  - coal, bituminous: Sprunk, G.C., 1
    - analyses: Davis, J.D., 2
    - petrography: Parks, B.C., 1
    - structures: Theissen, R., 1
  - Mercer Fire Clay: Weitz, J.H., 1
  - Oswego Sandstone, Ordovician: Lanning, D.R., 1
  - sedimentary rocks, petrofabric analysis: Griffiths, J.C., 6
  - underclay: Schultz, L.G., 1

Physical geology
  - joints: Nickelsen, R.P., 3
    - in coal: Moore, E.S., 1
  - Pittsburgh-Huntingdon Basin: Lockett, J.R., 1
  - spoil banks: Swartz, F.M., 2

Physiographic geology
  drainage changes, Pleistocene: Stout, W.E., 1
  glacial geology: Sitler, R.F., 4
  Lake Ohio, popular: James, J.F., 1
  mudflows: Ferm, J.C., 3
  Ohio River, popular: James, J.F., 1
  Ohio River Valley character: Carlston, C.W., 2
  slumps: Ferm, J.C., 3
  stream patterns: Morisawa, M.E., 1
  Western Pennsylvania: Thomas, D., 1

PENNSYLVANIAN PERIOD, *see also* Paleozoic Era
  Allegheny Co.: Frazier, S.B., 1; Sheafer, W.L., 3d, 1; Tindell, W.N., 1
    fresh water limestone: Adams, H.J., 1
  Armstrong Co.: Burke, J.J., 1; Fleck, W.P., 1
    Kittanning-Freeport area: Raine, J.W., 3d, 1
  Blair Co.: Swartz, F.M., 8
  Butler Co.: Fettke, C.R., 15; Lytle, W.S., 10
    Foxburg Quad.: Angermann, T.W., 1
  Cambria Co., New Florence Quad.: Shaffner, M.N., 1, 5
  Cameron Co., Driftwood Quad.: Bolger, R.C., 5
  Carbon Co.: Gault, H.R., 4
  Central Pennsylvania: Arndt, H.H., 1; Willard, B., 17
  Centre Co.: Ebright, J.R., 4; Williams, E.G., 2
  Clarion Co.: Lesley, J.P., 6
    Foxburg Quad.: Angermann, T.W., 1
  Clearfield Co.: Johnson, W.R., 1; Nickelsen, R.P., 1; Roberts, J.L., 1; Williams, E.G., 1, 2
  Clinton Co.: Ebright, J.R., 4; Ingham, A.I., 2
    Leidy Gas Field: Ebright, J.R., 2, 3
  Elk Co.: Lesley, J., 1
    Driftwood Quad.: Bolger, R.C., 5
  Fayette Co.: Lyman, B.S., 1; Sherrill, R.E., 1; Stewart, D.S., 1
    Donegal Quad.: Shaffner, M.N., 2
  Forest Co.: Fettke, C.R., 10
    Sheffield Quad.: Ingham, A.I., 3
  Greene Co.: Cross, A.T., 1; Sherrill, R.E., 1
  Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
  Jefferson Co.: Swartz, F.M., 8
    Kittanning Formation: Ferm, J.C., 4
  Lawrence Co.: Weis, G.F., 1
  Luzerne Co.: Powell, W.B., 1
  Lycoming Co.: Ebright, J.R., 4
  McKean Co.: Fettke, C.R., 26; Owen, D.D., 1
  Northeastern Pennsylvania: Arndt, H.H., 1; Ashley, G.H., 5; Ashmead, D.C., 1; Dyson, J.L., 2; Willard, B., 5
    Pottsville Formation: Wood, G.H., Jr., 1
  Northwestern Pennsylvania: Lytle, W.S., 13
  Pennsylvania: Ashley, G.H., 1; Bertrand, P., 1; Bode, H., 1; Clark, W.B., 2; Dannenberg, A., 1; Levorsen, A.I., 1; Mitchum, R.M., Jr., 1; Trueman, A.E., 1; Wanless, H.R., 1, 3, 4, 5; Willard, B., 6; Williams, E.G., 4
    drainage patterns: Friedman, S.A., 1
  floral zones: Darrah, W.C., 3; Jongmans, W.J., 1
  Potter Co., Driftwood Quad.: Bolger, R.C., 5
  Schuylkill Co., Minersville-Tremont Quads.: Wood, G.H., Jr., 2
  Somerset Co.
    Donegal Quad.: Shaffner, M.N., 2
    Meyersdale Quad.: Flint, N.K., 1
    New Florence Quad.: Shaffner, M.N., 1, 5
  southern: Flint, N.K., 2
  Southwestern Pennsylvania: Cross, A.T., 5; Darrah, W.C., 1; Martin, G.C., 1; Moore, R.C., 1; Moran, W.E., 1; Stevenson, J.J., 1; Swartz, C.K., 2, 3
    Pittsburgh Coal: Cross, A.T., 4, 7
  Tioga Co.: Taylor, R.C., 1
  Venango Co.: Lytle, W.S., 10, 12
    Foxburg Quad.: Angermann, T.W., 1
  Warren Co.: Fettke, C.R., 33
    Sheffield Quad.: Ingham, A.I., 3
  Washington Co.: Cross, A.T., 1; Sherrill, R.E., 1
  Western Pennsylvania: Andrews, E.B., 1; Dutcher, R.R., 1; Fettke, C.R., 42, 55; Fieldner, A.C., 5; Johnston, J.K., 1; Lytle, W.S., 2; Prouty, C.E., 5; Renick, B.C., 1; Robinson, J.F., 1
    flora: Darrah, W.C., 2
    fossil zones: Williams, E.G., 3
    Mercer Limestone: Mark, C.G., 1
  Westmoreland Co.
    Donegal Quad.: Shaffner, M.N., 2
    New Florence Quad.: Shaffner, M.N., 1, 5

PERMIAN PERIOD, *see also* Paleozoic Era
  Greene Co.: Arkle, T., Jr., 1; Cross, A.T., 1, 6; Hennen, R.V., 1; Sherrill, R.E., 1
  Southeastern Pennsylvania: Lyman, B.S., 2
  Southwestern Pennsylvania: Case, E.C., 2; Cross, A.T., 3, 5; Darrah, W.C., 1; Fettke, C.R., 55; Johnston, J.K., 1; Martin, G.C., 1; Martin, W.D., 1; Moore, R.C., 1; Moran, W.E., 1; Stevenson, J.J., 1; White, C.D., 7; Willard, B., 6
    floral zones: Darrah, W.C., 3
  Washington Co.: Arkle, T., Jr., 1; Cross, A.T., 1, 6; Sherrill, R.E., 1

PERRY COUNTY, *see also* Pennsylvania and Pennsylvania-Central
  Areal geology
    Hidden Valley Boy Scout Camp: Miller, J.T., 2
    New Bloomfield Quad.: Cleaves, A.B., 1
    Perry Co., popular: Miller, J.T., 1
  Economic geology
    iron: Swartz, F.M., 12
  Historical geology
    Silurian, popular: Miller, J.T., 2
  Mineralogy
    K-bentonite, corundum polymorph: Lapham, D.M., 2
  Paleontology
    Brachiopoda
      Devonian: Hall, J., 21
      Silurian: Cloud, P.E., Jr., 1
    Bryozoa, Devonian: McNair, A.H., 1
    Cystoidea, Silurian: Schuchert, C., 3
    Invertebrata, Devonian: Rafinesque, C.S., 3
    Pelecypoda, Devonian: Rafinesque, C.S., 6
    Pisces, Silurian: Eastman, C.R., 2
    plants, Devonian: Rafinesque, C.S., 3

PETROLEUM, *see also* Mineral resources
  anticlinal theory: Rogers, H.D., 9
  Armstrong Co.: Lesley, J.P., 9
  Butler Co., Butler Quad.: Lytle, W.S., 3
  Cameron Co.: Dickeson, M.W., 4
  Chester Co.: Bibbins, A.B., 1
  Clarion Co.: Lesley, J.P., 6
  Elk Co.: Northwestern Pennsylvania Oil and Coal Co., 1
  Forest Co., Sheffield Quad.: Ingham, A.I., 3
  Lancaster Co.: Bibbins, A.B., 1
  Luzerne Co.: Roberts, W.F., 15
  McKean Co.: Feldman, J., 1
    Bradford Quad.: Fettke, C.R., 39
    Bradford Oil Field: Fettke, C.R., 49; Buckwalter, J.F., 1
    Smethport Quad.: Seifert, W.H., 1
  Northeastern Pennsylvania: Willard, B., 5
  Northern Pennsylvania: Fettke, C.R., 36
  Northwestern Pennsylvania: Cathcart, S.H., 1, 2; Giddens, P.H., 1; Lytle, W.S., 13; Small, W.M., 1
  Pennsylvania
    relation to coal: Lilley, E.R., 1
    reserves: Lytle, W.S., 4; U. S. Geol. Survey, 1
    reservoir rocks: Griffiths, J.C., 7
    underground storage: Fettke, C.R., 54
  Venango Co.: Lombard, T.C., 1; Murray, D., 1
    Hamilton Corners Oil Field: Fettke, C.R., 49
  Warren Co., Sheffield Quad.: Ingham, A.I., 3
  Western Pennsylvania: Arnold, R., 1; Bonine, C.A., 1; Cathcart, S.H., 5; Clapp, F.G., 1; Dana, F.F., 1; Dickey, P.A., 2; Emmons, W.H., 1; Fettke, C.R., 2, 3, 4, 5, 28, 38, 40, 42, 44, 46, 50, 51, 53, 55; Hoeffer, H., 1; Lafferty, R.C., 1; Linn, E.H., 2; Lytle, W.S., 5, 7, 9; Mabery, C.F., 2; Miser, H.D., 2; Myers, T.H., 1; Pa. Geol. Survey, 2; Powers, S., 1; Redfield, A.H., 1; Rigaud, F., 1; Rittenhouse, G., 1; Swartz, F.M., 3; Thomas, J.M., 1; Ver Wiebe, W.A., 1, 4; Willard, B., 14; Woodward, H.P., 2, 3, 4, 5, 8, 9
    analyses: Lane, E.C., 1; Mabery, C.F., 1
    historical survey: Campbell, M.R., 3
    reserves: Lytle, W.S., 1; Pratt, W.E., 1; White, C.D., 4

PETROLOGY
  Conestoga Limestone, Ordovician, York Co.: Nickelsen, R.P., 4
  Pocono Sandstone, petrographic variability: Emery, J.R., 1

PHILADELPHIA COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Southeastern
  earthquakes: Heck, N.H., 2
  Economic geology
    marble: Strueve, H., 1
  Ground water
    Philadelphia Co.: Barksdale, H.C., 1; Graham, J.B., 2
    springs: Rush, B., 1

Historical geology
- Cambrian-Ordovician, Wissahickon Schist: Frondel, J.W., 1
- Pleistocene: Darton, N.H., 2
- Precambrian: Tilton, G.R., 1; Ward, R.F., 1
- radioactive dating: Jaffe, H.W., 1

Maps
- aeromagnetic, Norristown Quad.: Bromery, R.W., 11
- geologic: Barksdale, H.C., 1

Mineralogy
- hornblende: Rosenzweig, A., 1
- minerals: Carpenter, G.W,. 2
- siderite: Strueve, H., 1

Paleontology
- plant, Pleistocene: Rafinesque, C.S., 2

Petrology
- crystalline rocks: Watson, E.H., 2
- granodiorite: Postel, A.W., 1
- heavy minerals: Genth, F.A., 5
- Swarthmore Granodiorite, age: Postel, A.W., 3
- Wilmington complex, Precambrian: Ward, R.F., 1
- Wissahickon Schist: Wyckoff, D., 1
  - age: Postel, A.W., 3
  - granitization: Ch'Ih, C.S., 1

Physiographic geology
- Fall line: Abbe, C., Jr., 1

PHOLERITE
- Schuylkill Co.: Genth, F.A., 2

PHYSIOGRAPHY, *see also* individual features
- Berks Co., erosion surface: Wilkens, H., 2
- Central Pennsylvania, floodplain cross section: Lattman, L.H., 2
- Columbia Co., periglacial features: Peltier, L.C., 2
- Eastern Pennsylvania, erosion surface remnants: Macar, P., 1
- Erie Co., glacial lakes: Hough, J.L., 1
- McKean Co., relative relief: Chilcote, R.H., 1
- Northcentral Pennsylvania, drift mounds: Corss, F., 1
- Northwestern Pennsylvania: Wright, W., 1
  - glacial lakes: Taylor, F.B., 1
- Pennsylvania: Béthune, P.F., de, 1; Bowman, I., 1; Lobeck, A.K., 3; Pownall, T., 1; Raisz, E.J., 1; Rogers, H.D., 8; White, G.W., 1
  - Appalachian Mountains, relief: Béthune, P.F., de, 2
  - elevations: Sangree, A., 1
  - glacial border: Pittelkow, J., 1
  - physiographic provinces: Fenneman, N.M., 1, 2
  - popular: Davis, W.M., 5
  - relation to economics: Myers, R.E., 4
  - sea level changes: Stevens, R.P., 1
  - topography, control of population: Bechdolt, A.F. 1
- Philadelphia Co., fall line: Abbe. C., Jr., 1
- Southcentral Pennsylvania, stream asymmetry: Broscoe, A.J., 1
- Southeastern Pennsylvania, Brandywine Creek channel: Wolman, M.G., 1, 2
- Southwestern Pennsylvania, Ohio River area: Hutchins, T., 1
- Western Pennsylvania: Thomas D., 1
  - abandoned channels: Campbell, M.R., 1
  - mudflows and slumps: Ferm, J.C., 3
  - Ohio River: Carlston, C.W., 2

PIKE COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern

Paleontology
- Stelleroidea, Devonian: Cramer, H.R., 4

PISCES, *see also* Vertebrata
- Allegheny Co.
  - Mississippian: Newberry, J.S., 2
  - Pennsylvanian: Romer, A.S., 3
- Beaver Co., Pennsylvanian: Cope, E.D., 4, 6
- Blair Co., Mississippian: Hay, O.P., 1
- Bradford Co., Devonian: Eastman, C.R., 2
- Bucks Co., Triassic: Bock, W., 6, 7; McLaughlin, D.B., 6
- Chester Co., Triassic: Leidy, J., 1; Schaeffer, B., 2
- Monroe Co., Silurian: Beerbower, J.R., 2
- Montgomery Co., Triassic: Bock, W., 6; Schaeffer, B., 1, 3
- Northern Pennsylvania, Devonian: Eastman, C.R., 2; Newberry, J.S., 2
- Pennsylvania, Paleozoic: Newberry, J.S., 4
- Perry Co., Silurian: Eastman, C.R., 2
- Southeastern Pennsylvania, Triassic, popular: Bock, W., 5
- Tioga Co., Devonian: Cope, E.D., 7; Eastman, C.R., 2; Newberry, J.S., 2
- Venango Co., Mississippian: Newberry, J.S., 1
- Warren Co., Devonian: Eastman, C.R., 1, 2
- Washington Co., Permian: Romer, A.S., 1

PLEISTOCENE EPOCH, *see also* Cenozoic Era and Tertiary Period
Bucks Co.: Willard, B., 19
Butler Co.: Fettke, C.R., 15
Cambria Co., New Florence Quad.: Shaffner, M.N., 5
Central Pennsylvania: Conlin, R.R., 1
Centre Co.: Sears, P.B., 1
Chester Co., Marsh: Deevey, E.S., Jr., 1
Crawford Co.: Walker, P.C., 1
Eastern Pennsylvania: Flint, R.F., 1; Willard, B., 10
Erie Co.: Fettke, C.R., 11, 14, 23
Indiana Co., New Florence Quad.: Shaffner, M.N., 5
Northeastern Pennsylvania: Dyson, J.L., 2
Northern Pennsylvania, post-glacial uplift: Fairchild, H.L., 3
Pennsylvania: Dillon, L.S., 1; Eardley, A.J., 1; Hall, J., 3; Martin, P.S., 1; Reeside, J.B., Jr., 2
Philadelphia Co.: Darton, N.H., 2
Potter Co.: Goodlet, J.C., 1
Southeastern Pennsylvania, Delaware River Valley: Lewis, H.C., 2; Richards, H.G., 2
Somerset Co., New Florence Quad.: Shaffner, M.N., 5
Warren Co.: Fettke, C.R., 8, 29
Westmoreland Co., New Florence Quad.: Shaffner, M.N., 5

POPULAR AND ELEMENTARY
Bradford Co., geology: Myers, R.E., 3
brucite, Chester-Delaware Cos.: Thomas, C.A., 1
Brush Creek Limestone fauna, Pennsylvanian, Western Pennsylvania: Hamilton, H.V., 2
Cambridge Limestone fauna, Pennsylvanian, Western Pennsylvania: Hamilton, H.V., 4
deweylite, Chester-Delaware Cos.: Thomas, C.A., 1
glacial geology, Pennsylvania: Newberry, J.S., 3
glacial Lake Ohio, Western Pennsylvania: James, J.F., 1
ground water, Allegheny Co., Pittsburgh area: Van Tuyl, D.W., 4
Hidden Valley Boy Scout Camp, Perry Co.: Miller, J.T., 2
loess, Susquehanna River Valley: Higbee, H.W., 1
mineral collecting
  Eastern Pennsylvania: Myers, R.E., 1
  Northampton Co.: Zodac, P., 1
Ohio River, Western Pennsylvania: James, J.F., 1
Perry Co., geology: Miller, J.T., 1
physiography of Pennsylvania: Davis, W.M., 5
Pisces, Triassic, Southeastern Pennsylvania: Bock, W., 5
potholes, Susquehanna River: Myers, R.E., 2
pseudomorphs, Lancaster-York Cos.: Anonymous, 25
seed pod, Pennsylvanian, Armstrong-Beaver-Elk Cos.: Hamilton, H.V., 3
topography, Pennsylvania: Myers, R.E., 4
Wood Chrome Mine, Lancaster Co.: Duersmith, L.J., 1

PORIFERA, *see also* Invertebrata
Crawford Co., Devonian: Caster, K.E., 3
Erie Co., Devonian: Caster, K.E., 3; Clarke, J.M., 6; Hall, J., 14, 23
Northwestern Pennsylvania, Devonian-Mississippian: Caster, K.E., 4
Susquehanna-Tioga Cos., Devonian: Hall, J., 23
Venango Co., Mississippian: Hall, J., 14, 23
Warren Co.
  Devonian: Caster, K.E., 3; Hall, J., 14, 23
  Mississippian: Hall, J., 14, 23

POROSITY
Allentown Dolomite, Northampton Co.: Moser, E.L., Jr., 1
Bradford Sand
  McKean Co.: Howell, B.F., Jr., 1
  Northern Pennsylvania: Griffiths, J.C., 1, 3
Conococheague Limestone, Berks Co.: Werner, J.E., 1
oil sands, Northwestern Pennsylvania: Melcher, A.F., 1
reservoir rocks, Pennsylvania: Lauer, A.W., 1
sandstones
  Central Pennsylvania: Rosenfeld, M.A., 1, 2
  Pennsylvania: Griffiths, J.C., 2; Hutta, J.J., 2

POTHOLES
Susquehanna River, Lancaster Co.: Myers, R.E., 2

POTTER COUNTY, *see also* Pennsylvania and Pennsylvania-Northern
Economic geology
natural gas, Driftwood Quad.: Bolger, R.C., 5

Ground water
  ice cave: Andrews, M.O., 1
Historical geology
  Devonian: Fettke, C.R., 25; Kreidler, W.L., 1; Woodruff, J.G., 1
  Devonian-Pennsylvanian, Driftwood Quad.: Bolger, R.C., 5
  Pleistocene: Goodlet, J.C., 1
  Silurian-Devonian: Fettke, C.R., 6
Maps
  economic, oil and gas: Kreidler, W.L., 1
  geologic, Leidy Gas Field: Ebright, J.R., 2
  physiography
    Genessee Quad., glacial geology: Denny, C.S., 3
    Kettle Creek area: Denny, C.S., 3
    West Branch Susquehanna River, restored surface: Denny, C.S., 3
  structure, Driftwood Quad.: Bolger, R.C., 5
  structure contour
    Oriskany Sandstone, East Fork-Wharton Gas Field: Bolger, R.C., 5
    Pocono Sandstone: Ebright, J.R., 2
    Tully Limestone, East Fork-Wharton Gas Field: Bolger, R.C., 5
Physical geology
  periglacial features: Goodlet, J.C., 1
  structure, Driftwood Quad.: Bolger, R.C., 5
Physiographic geology
  ice cave: Andrews, M.O., 1
  glacial geology: Denny, C.S., 3
    Genessee Quad.: Denny, C.S., 3
  periglacial features: Denny, C.S., 1; Goodlet, J.C., 1
  stream profile: Broscoe, A.J., 2

PRECAMBRIAN
  Adams Co., Carlisle Quad.: Stose, G.W., 4
  Berks Co.: Boyd, J.A., 1; Gault, H.R., 3
    Boyertown Quad.: Buckwalter, T.V., Jr., 6
  Bucks Co.: Anonymous, 42; Freedman, J.L., 1; Willard, B., 19
  Chester Co.: Bascom, F., 1; Layman, F.G., 1; Watson, E.H., 1, 2
    Honeybrook-Phoenixville Quads.: Postel, A.W., 2
  Cumberland Co., Carlisle Quad.: Stose, G.W., 4
  Delaware Co.: Ward, L.F., 1; Watson, E.H., 1
  Lancaster Co.: Bascom, F., 1
  Lebanon Co.: Gray, C., 7
  Pennsylvania: Hall, J., 3; Moss, R.G., 1
  Philadelphia Co.: Tilton, G.R., 1; Ward, R.F., 1; Watson, E.H., 2
  Southeastern Pennsylvania: Buckwalter T.V., Jr., 3; Eardley, A.J., 1; Frazer, P., Jr., 3; Hunt, T.S., 1; King, P.B., 5; Maclure, W., 1; Mathews, E.B., 1; Montgomery, A., 2; Richards, H.G., 1; Rodgers, J., 1; Willard, B., 10
    Baltimore Gneiss: Davis, G.L., 1
    Delaware River Valley: Richards, H.G., 2
  York Co.: Jonas, A.I., 1
    Carlisle Quad.: Stose, G.W., 4

PSEUDOMORPHS
  Lancaster-York Cos., limonite: Anonymous, 25

PTEROPODA, *see also* Invertebrata
  Huntingdon Co., Devonian: Hall, J., 12
PYRITE, *see also* Mineralogy
  Chester Co.: Genth, F.A., 1
  Lebanon Co.: Travis, C., 1

PYROMORPHITE, *see also* Mineralogy
  Chester Co.: Genth, F.A., 1

QUARTZ, *see also* Mineral resources
  Monroe Co.: Lee, O.I., 1

QUARTZITE, *see also* Metamorphic rocks and Mineral resources
  Central Pennsylvania, petrology: Krynine, P.D., 3; Wood, G.V., 1
  Lancaster Co.: Strueve, H., 1

RADIOACTIVE DATING, *see also* Radiocarbon dating
  Carbon Co.: Stern, T.W., 1
  Franklin Co.: Jaffe, H.W., 1
  Lebanon Co.: Urry, W.D., 1
  Philadelphia Co.
    Precambrian: Tilton, G.R., 1
    Swarthmore Granodiorite: Postel, A.W., 3
    Wissahickon Schist: Postel, A.W., 3
  Southeastern Pennsylvania: Jaffe, H.W., 1
    Precambrian: Rodgers, J., 1
    Triassic: Rodgers, J., 1

RADIOCARBON DATING
  Allegheny Co.: Arnold, J.R., 1; Libby, W.F., 1; Suess, H.E., 1
  Chester Co., The Marsh: Deevey, E.S., Jr., 1
  Erie Co.: Droste, J.B., 6; Rubin, M., 1

RADIOACTIVE MINERALS, *see also* individual types
  Beaver Co., coal: Ferm, J.C., 2
  Bucks Co.: Klemic, H., 3; McKeown, F.A., 1; Stewart, R.H., 1
  Carbon Co.: Dyson, J.L., 3; Finch, W., 1; Montgomery, A., 3
  Clearfield Co., coal: Ferm, J.C., 2
  Dauphin Co.: Klemic, H., 3
  Eastern Pennsylvania: Schnabel, R.W., 1
  Fulton-Huntingdon Cos.: Klemic, H., 3
  Jefferson Co., coal: Ferm, J.C., 2
  Luzerne Co.: Klemic, H., 3
  Northampton Co.: Stewart, R.H., 1
  Northeastern Pennsylvania: Welch, S.W., 1
  Pennsylvania: Cooper, M., 1; Klemic, H., 4
    coal: Nelson, J.M., 1
  Western Pennsylvania, coal: Patterson, E.D., 1

REPTILIA, *see also* Vertebrata
  Adams Co., Triassic: Baird, D., 1
  Allegheny Co., Pennsylvanian: Case, E.C., 1
  Blair Co., Pleistocene: Gilmore, C.W., 1
  Bucks Co., Triassic: McLaughlin, D.B., 6
  Chester Co., Triassic: Cope, E.D., 2, 3; McGregor, J.H., 1
  Lancaster Co., Triassic: Price, J.W., Sr., 1
  Lehigh Co., Triassic: Emmons, E., 1; Huene, F., von, 1; McGregor, J.H., 1
  Montgomery Co.
    Pleistocene: Gilmore, C.W., 1
    Triassic: Cope, E.D., 2
  Southeastern Pennsylvaina, Triassic: Bock, W., 2
  York Co., Triassic: Baird, D., 1; Cope, E.D., 5

RIPIDOLITE, *see also* Mineralogy
  Chester Co.: Clarke, F.W., 2

RUTILE, *see also* Mineralogy
  Chester Co.: Watson, T.L., 1

SALT, *see also* Mineral resources
  Lycoming Co.: Anonymous, 2; Lycoming Coal Co., 1
  Pennsylvania: Griggs, R.L., 1
  Western Pennsylvania: Ames, J.A., 1; Fettke, C.R., 52; Krumbein, W.C., 1

SAND, *see also* Mineral resources
  Bucks Co.: Gault, H.R., 5; Ward, F., 1
  Cambria Co., New Florence Quad.: Shaffner, M.N., 5
  Indiana Co.. New Florence Quad.: Shaffner, M.N., 5
  Northwestern Pennsylvania: Shepps, V.C., 3
  Somerset Co., New Florence Quad.: Shaffner, M.N., 5
  Westmoreland Co., New Florence Quad.: Shaffner, M.N., 5

SANDSTONE, *see also* Mineral resources and Sedimentary rocks
  Cambria Co., New Florence Quad.: Shaffner, M.N., 1, 5
  Cameron Co.: Dickeson, M.W., 4
  Dauphin Co., analyses: Clarke, F.W,. 4
  Elk Co.: Jackson, C.T., 1
  Fayette Co., Donegal Quad.: Shaffner, M.N., 2
  Indiana Co., New Florence Quad.: Shaffner, M.N., 1, 5
  Somerset Co.
    Donegal Quad.: Shaffner, M.N., 2
    Meyersdale Quad.: Flint, N.K., 1
    New Florence Quad.: Shaffner, M.N., 1, 5
    southern: Flint, N.K., 2
  Westmoreland Co.
    Donegal Quad.: Shaffner, M.N., 2
    New Florence Quad.: Shaffner, M.N., 1, 5

SCHIST, *see also* Metamorphic rocks
  Bucks Co.: Virgin, W.W., Jr., 2
  Delaware Co.: Tomlinson, W.H., 4
  Lehigh Co.: Virgin, W.W., Jr., 2
  Northampton Co.: Virgin, W.W., Jr., 2
  Philadelphia Co., Wissahickon Schist: Ch'Ih, C.S., 1; Postel, A.W., 3

SCHUYLKILL COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern
  bacteria in coal: Lipman, C.B., 1
  structure contour map, first application: Ashburner, C.A., 2
 Areal geology
  Minersville-Tremont Quads.: Wood, G.H., Jr., 2
  Tamaqua area: Kidda, M.L., 1
 Economic geology
  coal, anthracite: Anonymous, 4; Baird, T., 2, 3; Bear Valley Coal Co., 1; Hall, J., 1; Johnson, O., 1; Lesley, J.P., 3; New York and Schuylkill Coal Co., 1; North American Coal Co., 1; Roberts, W.F., 1, 8, 13, 14; Sheafer, P.W., 3; Strong, H.K., 1, 2
    Ashland Quad.: Haley, B.R., 1, 2
    Delano Quad.: Maxwell, J.A., 1
    Minersville-Tremont Quads.: Wood, G.H., Jr., 2

    - Mt. Carmel Quad.: Rothrock, H.E., 5
    - Shenandoah Quad.: Danilchik, W., 1; Kehn, T.M., 1
  - iron: Hall, J., 1; Roberts, W.F., 1, 14
  - limestone: Roberts, W.F., 14
  - uranium, Minersville-Tremont Quads.: Wood, G.H., Jr., 2
- *Historical geology*
  - Mississippian-Pennsylvanian, Minersville-Tremont Quads.: Wood, G.H., Jr., 2
- *Maps*
  - economic
    - coal, anthracite: Baird, T., 1, 2, 3
      - Ashland Quad.: Haley, B.R., 1, 2
      - Delano Quad.: Maxwell, J.A., 1
      - Mt. Carmel Quad.: Rothrock, H.E., 5
      - Shenandoah Quad.: Danilchik, W., 1; Kehn, T.M., 1
  - geologic, Minersville-Tremont Quads.: Wood, G.H., Jr., 2
  - structure, Buck Mountain-Mammoth Coals: Rothrock, H.E., 5
  - structure contour
    - Ashland Quad.: Haley, B.R., 1, 2
    - Delano Quad.: Maxwell, J.A., 1
    - Mammoth Coal: Ashburner, C.A., 2
    - Shenandoah Quad.: Danilchik, W., 1; Kehn, T.M., 1
- *Mineralogy*
  - pholerite: Genth, F.A., 2
- *Paleontology*
  - bacteria: Farrell, M., 1
  - Brachiopoda, Devonian: Cloud, P.E., Jr., 1
  - Branchiopoda, Mississippian: Jones, T.R., 1, 2; Raymond, P.E., 3
  - Insecta, Pennsylvanian: Handlirsch, A., 1
  - plants, Pennsylvanian: Abbott, M.L., 1; Gresley, W.S., 2; Harlan, R., 3
  - spores, Mississippian: Chaloner, W.G., 1
- *Petrology*
  - coal, anthracite, analyses: Rogers, H.D., 1
- *Physical geology*
  - fault, Schuylkill Gap: Burtner, R., 1

SEDIMENTARY STRUCTURES, *see also* individual types
- concretions, Northeastern Pennsylvania: Gresley, W.S., 1
- cross bedding, Centre-Clearfield Cos., Pennsylvanian: Nickelsen, R.P., 2
- grain orientation, reservoir sandstones: Griffiths, J.C., 6
- mud cracks, Northampton Co.: Willard, B., 12
- ripplemarks, Northampton Co.: Willard, B., 12
- sun cracks, Devonian, Northeastern Pennsylvania: Chadwick, G.H., 6

SERPENTINE, *see also* Mineral resources and Mineralogy
- Delaware-Lancaster Cos.: Genth, F.A., 4
- Northampton Co.: Montgomery A., 4; Sarda, G.S., 1
- Southeastern Pennsylvania: Bates, T.F., 1

SHALE, *see also* Mineral resources
- Clearfield Co., petrography: Bates, T.F., 2
- Fayette Co., Donegal Quad.: Shaffner, M.N., 2
- Pennsylvania, petrography: Sutton, W.H., 1
- Somerset Co.
  - Donegal Quad.: Shaffner, M.N., 2
  - southern: Flint, N.K., 2
- Westmoreland Co., Donegal Quad.: Shaffner, M.N., 2

SIDERITE, *see also* Mineralogy
- Philadelphia Co.: Strueve, H., 1
- Western Pennsylvania: Rogers, W.B., 1

SILICA, *see also* Mineral resources
- Bucks Co.: Gault, H.R., 5
- Central Pennsylvania, Beekmantown Group: Folk, R.L., 1
- Pennsylvania: Taylor, T.G., 1

SILURIAN PERIOD, *see also* Paleozoic Era
- Bedford Co.: Swartz, C.K., 4; Wintermute, T.J., 1
- Berks Co.: Moseley, J.R., 2
- Blair Co.: Swartz, F.M., 8; Wimmer, P., 1
- Butler Co.: Fettke, C.R., 15
- Central Pennsylvania: Arndt, H.H., 1; Swartz, F.M., 5; Willard, B., 17
  - petrography: Bergenback, R.E., 1
- Dauphin Co.: Swartz, F.M., 13
- Eastern Pennsylvania: Hunt, T.S., 3
  - petrography: Bergenback, R.E., 1
  - Shawangunk Grit: Billingsley, P., 1
- Elk Co.: Fettke, C.R., 35, 37
- Erie Co.: Fettke, C.R., 11, 14, 22; Wagner, W.R., 3
- Huntingdon Co., Allensville Quad.: Dort, W., Jr., 5
- McKean Co.: Fettke, C.R., 7, 9, 27, 30, 32; Hoffacker, B.L., Jr., 1
- Mercer Co.: Wagner, W.R., 2
- Monroe Co., Delaware Water Gap Quad.: Kurtz, A.E., 1
- Northeastern Pennsylvania: Arndt, H.H., 1; Johnson, M.E., 4; Moseley, J.R., 1; Willard, B., 5

    Northern Pennsylvania: Fettke, C.R., 34
    Northwestern Pennsylvania: Cathcart, S.H., 2
    Pennsylvania: Alling, H.L., 1; Amsden, T.W., 1; Grabau, A.W., 2; Hall,' J., 11; Reeside, J.B., Jr., 1; Swartz, F.M., 1; Willard, B., 6
      paleocurrents: Yeakel, L., 2
      salt: Griggs, R.L., 1
    Perry Co., Hidden Valley Boy Scout Camp: Miller, J.T., 2
    Potter Co.: Fettke, C.R., 6
    Snyder Co.: Wagner, W.R., 1
    Southeastern Pennsylvania: Dyson, J.L., 2; Mathews, E.B., 1
    Tioga Co.: Fettke, C.R., 21
    Warren Co.: Fettke, C.R., 8, 20, 24
    Western Pennsylvania: Fettke, C.R., 42, 55; Rittenhouse, G., 1; Robinson, J.F., 1; Rogers, D., Jr., 1
      evaporites: Krumbein, W.C., 1

SILLIMANITE, *see also* Mineralogy
    Delaware Co.: Greig, J.W., 1; Navais, L., 1; Roy, R., 1; Wycoff, R.W.G., 1

SLATE, *see also* Metamorphic rocks and Mineral resources
    Lehigh Co.: Gray, C., 13; Lafayette College, 1
      x-ray analysis: Anderson, H.V., 1
    Northampton Co.: Behre, C.H., Jr., 1; Lafayette College, 1
      x-ray analysis: Anderson, H.V., 1

SNYDER COUNTY, *see also* Pennsylvania and Pennsylvania-Central
  Economic geology
    iron: Earle, R.B., 1
  Historical geology
    Silurian-Devonian: Wagner, W.R., 1
  Paleontology
    Ostracoda, Silurian: Hoskins, D.M., 1
  Physiographic geology
    caves: Landis, C., 3
      McClure Cave: Anonymous, 29

SOILS AND SOIL EROSION
    Berks Co., relation to bedrock: O'Brien, G.D., 2
    Pennsylvania: Patrick, A.L., 1
      mineralogy: Jeffries, C.D., 1
SOMERSET COUNTY, *see also* Pennsylvania and Pennsylvania-Western
  Areal geology
    Berlin Quad.: Kuhn, T.A., 1
    Donegal Quad.: Shaffner, M.N., 2
    Lower and Upper Turkeyfoot Townships: Radisi, J., 1
    Meyersdale Quad.: Flint, N.K., 1
    New Florence Quad.: Shaffner, M.N., 1, 5
  Economic geology
    clay
      Meyersdale Quad.: Flint, N.K., 1
      New Florence Quad.: Shaffner, M.N., 1, 5
      southern: Flint, N.K., 2
    coal, bituminous: D'Invilliers, E.V., 1; Ferguson, J.H., 1; Union Coal Co., 1; Wolff, G.D., 1
      analyses: Campbell, M.R., 4, 7
      Donegal Quad.: Shaffner, M.N., 2
      Meyersdale Quad.: Flint, N.K., 1
      New Florence Quad.: Shaffner, M.N., 1, 3, 4, 5
      southern: Flint, N.K., 2; French, G., 1; Wallace, J.J., 2
    fire clay: Hall, G.M., 1
      Donegal Quad.: Shaffner, M.N., 2
    iron: Ferguson, J.H., 1; Union Coal Co., 1; Wolff, G.D., 1
      New Florence Quad.: Shaffner, M.N., 1, 5
    limestone: Ferguson, J.H., 1; Union Coal Co., 1; Wolff, G.D., 1
      Donegal Quad.: Shaffner, M.N., 2
      Meyersdale Quad.: Flint, N.K., 1
      New Florence Quad.: Shaffner, M.N., 1, 5
      southern: Flint, N.K., 2
    natural gas
      Donegal Quad.: Shaffner, M.N., 2
      New Florence Quad.: Shaffner, M.N., 1, 5
      southern: Flint, N.K., 2
    sand and gravel, New Florence Quad.: Shaffner, M.N., 5
    sandstone
      Donegal Quad.: Shaffner, M.N., 2
      Meyersdale Quad.: Flint, N.K., 1
      New Florence Quad.: Shaffner, M.N., 1, 5
      southern: Flint, N.K., 2
    shale
      Donegal Quad.: Shaffner, M.N., 2
      southern: Flint, N.K., 2
  Ground water
    New Florence Quad.: Shaffner, M.N., 5
  Historical geology
    Devonian-Pennsylvanian
      Donegal Quad.: Shaffner, M.N., 2
      Meyersdale Quad.: Flint, N.K., 1
      New Florence Quad.: Shaffner, M.N., 1
      southern: Flint, N.K., 2
    Mississippian-Pleistocene, New Florence Quad.: Shaffner, M.N., 5

- *Maps*
  - economic
    - coal, bituminous: Union Coal Co., 1; Wallace, J.J., 2
      - New Florence Quad.: Shaffner, M.N., 5
      - Southampton Coal Basin: Ferguson, J.H., 1
    - mineral resources
      - Donegal Quad.: Shaffner, M.N., 2
      - New Florence Quad.: Shaffner, M.N., 1, 5
      - southern: Flint, N.K., 2
  - geologic
    - Donegal Quad.: Shaffner, M.N., 2
    - New Florence Quad.: Shaffner, M.N., 1, 5
    - southern: Flint, N.K., 2
    - Wellersburg area: Swartz, C.K., 3
  - structure contour
    - Donegal Quad., Lower Kittanning Coal: Shaffner, M.N., 2
    - New Florence Quad., Lower Kittanning Coal: Shaffner, M.N., 1
    - southern, Upper Kittanning Coal: Flint, N.K., 2
- *Mineralogy*
  - jarosite: Warshaw, C.M., 1
- *Paleontology*
  - rhinoceros, age uncertain: Featherstonhaugh, G.W., 1; Harlan, R., 2
- *Petrology*
  - Pennsylvanian sandstones: Ozoe, M.A., 1
- *Physiographic geology*
  - Shafer Run Cave: Gorman, J.M., 1

SPHALERITE, *see also* Mineralogy
- Chester Co.: Genth, F.A., 1

SPRINGS, *see also* Ground water
- Adams Co.: Scherer, P., 1
- Allegheny Co.
  - analyses: Haywood, J.K., 1
  - brine: Daubeny, C., 1
- Bedford Co., analyses: Haywood, J.K., 1
- Bucks Co.: Rush, B., 1
- Central Pennsylvania: Turner, T.D., 4
- Chester Co.: Meade, W., 1
- Lycoming Co.: Haas, J., 2
- Pennsylvania
  - analyses: Bell, J., 1
  - mineral: Crook, J.K., 1; Peale, A.C., 1; Rush, B., 1; Scherer, P., 1
  - temperatures: Mangan, J.W., 1
- Philadelphia Co.: Rush, B., 1

STELLEROIDA
- Central Pennsylvania, Devonian: Schuchert, C., 7
- Lebanon Co., Ordovician: Cramer, H.R., 2
- Pike Co., Devonian: Cramer, H.R., 4

STONE, *see also* Industrial minerals and Mineral resources
- Bucks Co.: Gault, H.R., 5
- Lycoming Co.: Hodge, J.T., 1
- Pennsylvania: Bowles, O., 1
  - analyses: Eckel, E.C., 1
- Tioga Co.: Taylor, R.C., 1
- Washington Co.: Lesley, J.P., 5

STRUCTURAL GEOLOGY, *see also* Faults and faulting, Folds and folding, and Thrusts and thrust faulting
- Lancaster Co., Peach Bottom Syncline: Agron, S.L., 1
- Northeastern Pennsylvania: Wood, G.H., Jr., 3
- Northwestern Pennsylvania, crustal movement: Moore, S., 1
- Pennsylvania: Eardley, A.J., 1; King, P.B., 1, 4; Stille, H., 1
  - major features: Parejas, E., 1
- York Co., Peach Bottom Syncline: Agron, S.L., 1

STYLOLITES
- Dauphin Co., Ordovician: Prouty C.E., 2
- Franklin-Lebanon Cos., Ordovician: Prouty, C.E., 2

SULPHUR, *see also* Mineral resources
- Washington Co., in coal: Mansfield, S.P., 1

SULLIVAN COUNTY, *see also* Pennsylvania and Pennsylvania-Northern
- *Economic geology*
  - coal, bituminous, analysis: Campbell, M.R., 4
- *Paleontology*
  - Pelecypoda, Devonian: Hall, J., 17

SUSQUEHANNA COUNTY, *see also* Pennsylvania and Pennsylvania-Northern
- *Geophysical investigations*
  - gravity: Duecker, J.C., 1
- *Historical geology*
  - Devonian: Kreidler, W.L., 1; Vanuxem, L., 1
- *Maps*
  - economic, petroleum and natural gas: Kreidler, W.L., 1
- *Paleontology*
  - Pelecypoda, Devonian: Hall, J., 13, 15, 16, 17
  - Porifera, Devonian: Hall, J., 23

- **SYNCLINES**
  - Lancaster-York Cos., Peach Bottom Syncline: Agron, S.L., 1

- **TALC**, *see also* Mineral resources
  - Northampton Co.: Montgomery, A., 4

- **TALUS**, *see also* Physiography
  - Clinton Co., statistical analysis: Griffiths, J.C., 10

- **TEMPERATURE GRADIENTS**
  - Pennsylvania: Spicer, H.C., 1

- **TENTACULITIDA**, *see also* Invertebrata
  - Central Pennsylvania, Devonian: Percival, S.F., 1

- **TERRACES**, *see also* Glacial geology and Physiography
  - Berks Co.: Wilkens, H., 3
  - Central Pennsylvania, Susquehanna River: Kauffman, M.E., 1; Peltier, L.C., 1
  - Southwestern Pennsylvania
    - Monongahela River: Brown, S.B., 1
    - Ohio River: White, I.C., 3

- **TERTIARY PERIOD**, *see also* Cenozoic Era
  - Pennsylvania: Matthew, W.D., 1

- **THOROGUMMITE**, *see also* Radioactive minerals
  - Northampton Co.: Montgomery, A., 6

- **THRUSTS AND THRUST FAULTING**, *see also* Faults and faulting and Structural geology
  - Blair Co.: Moebs, N.W., 1
    - Birmingham Thrust Fault: Fox, H.D., 1
  - Huntingdon Co.: Moebs, N.W., 1
  - Southeastern Pennsylvania, nappes: Gray, C., 14

- **TIOGA COUNTY**, *see also* Pennsylvania and Pennsylvania-Northern
  - *Economic geology*
    - coal, bituminous: Beck, T.R., 1; Hughes, G.W.. 1; Taylor, R.C., 1
    - fire clay: Taylor, R.C., 1
    - iron: Hughes, G.W., 1; Taylor, R.C., 1
    - limestone: Taylor, R.C., 1
    - natural gas: Ashley, G.H., 3; Robinson, J.F., 2
    - nitrate: Mansfield, G.R., 1
    - stone, Taylor, R.C., 1
  - *Geophysical investigations*
    - gravity: Howell, B.F., Jr., 2
  - *Historical geology*
    - Devonian: Cobb, R.E., 1; Fettke, C.R., 13; Harding, R.W., 1; Kreidler, W.L., 1
    - Pennsylvania: Taylor, R.C., 1
    - Silurian-Devonian: Fettke, C.R., 21
  - *Maps*
    - Economic, petroleum and gas: Kreidler, W.L., 1
  - *Paleontology*
    - Brachiopoda, Devonian: Hall, J., 6, 7, 21
    - Edrioasteroidea, Devonian: Clarke, J.M., 2
    - Pelecypoda, Devonian: Eller, E.R., 1; Hall, J., 13, 15, 16, 17
    - Pisces, Devonian: Cope, E.D., 7; Eastman, C.R., 2; Newberry, J.S., 2
    - Porifera, Devonian: Hall, J., 23

- **TRACKS AND TRAILS**
  - amphibian, Pennsylvanian, Westmoreland Co.: Hitchcock, E., 1
  - reptilian, Triassic, Adams-York Cos.: Baird, D., 1

- **TREMOLITE**, *see also* Mineral resources and Mineralogy
  - Northampton Co.: Clarke, F.W., 1

- **TRIASSIC PERIOD**, *see also* Mesozoic Era
  - Adams Co., Carlisle Quad.: Stose, G.W., 4
  - Berks Co.: McLaughlin, D.B., 4, 5
  - Bucks Co.: Bock, W., 7; Johnson, M.E., 5; Lafayette College, 3; McLaughlin, D.B., 6; Willard, B., 19
  - Cumberland Co., Carlisle Quad.: Stose, G.W., 4
  - Lancaster Co.: McLaughlin, D.B., 2, 4, 5
    - Richland Quad.: Gray, C., 12
  - Lebanon Co.: Gray, C., 8; McLaughlin, D.B., 2, 4, 5
    - Lebanon Quad.: Geyer, A.R., 3; Gray, C., 12
  - Montgomery Co.: Lyman, B.S., 3; Watson, E.H., 3
  - Pennsylvania: Eardley, A.J., 1
  - Southeastern Pennsylvania: Bain, G.W., 1; Bock, W., 2, 6; Dana, J.D., 3; Dyson, J.L., 2; Finch, J., 1; Frazer, P., Jr., 3; Gregory, J.T., 1; Kummel, H.B., 1; Lebling, C., 1; Lyman, B.S., 2; McKee, E.D., 1; McLaughlin, D.B., 1, 3; Reeside, J.B., Jr., 3; Rodgers, J., 1; Rogers, W.B., 2; Shimer, H.W., 2; Willard, B., 10, 15; Woodward, H.P., 6
    - Delaware River Valley: Richards, H.G., 2
    - diabase: Darton, N.H., 1
    - Lockatong Formation: Van Houten, F.B., 1

  Stockton Formation: Dellwig, L.F., 1
  vortex monoclines: Bock, W., 3
 York Co., Carlisle Quad.: Stose, G.W., 4

TRILOBITA, *see also* Invertebrata
 Bedford Co.
  Cambrian: Walcott, C.D., 7
  Silurian: Swartz, C.K., 5
 Blair Co., Cambrian: Resser, C.E., 4, 8; Walcott, C.D., 6
 Bucks Co., Cambrian: Howell, B.F., Sr., 5
 Central Pennsylvania, Cambrian: Balk, C.L., 1; Tasch, P., 4; Wilson, J.L., 1, 2
 Centre Co.
  Cambrian: Resser, C.E., 5, 6, 8; Walcott, C.D., 6, 8, 9
  Ordovician: Tasch, P., 3; Walcott, C.D., 8, 9; Whittington, H.B., 1
 Clinton Co., Ordovician: Whittington, H.B., 1
 Cumberland Co., Ordovician: Hall, J., 2
 Franklin Co.
  Cambrian: Rasetti, F.R.D., 1; Resser, C.E., 1; Walcott, C.D., 4
  Ordovician: Cooper, B.N., 1; Sando, W.J., 1
 Huntingdon Co., Devonian: Delo, D.M.. 1
 Lancaster Co., Cambrian: Walcott, C.D., 5, 6
 Lebanon Co., Ordovician: Whittington, H.B., 1
 Luzerne Co., Pennsylvanian: Chow, M.M., 1
 Northampton Co., Cambrian: Howell, B.F., Sr., 3
 Northumberland Co., Devonian: Green, J., 1
 Pennsylvania
  Devonian: Delo, D.M., 1; Hall, J., 5
  Mississippian: Weller, J.M., 1
 York Co., Cambrian: Resser, C.E., 5; Walcott, C.D., 7

TYPE SECTIONS of formations named from Pennsylvania locations
 Allegheny Drift, Pleistocene: Deeley, R.M., 1
 Allegrippus Sandstone Member (of the Chemung Formation), Devonian: White, I.C., 4
 Ames Red Bed, Pennsylvanian: Swartz, C.K., 3
 Amity Shale, Devonian or Mississippian: Chadwick, G.H., 3
 Annville Limestone, Ordovician: Prouty, C.E., 7
 Arrowmink arkosic Gneiss, Precambrian: Bascom, F., *in* Mathews E.B., 1
 Bartholemew Siltstone Member (of the Orangeville Shale), Mississippian: deWitt, W., Jr., 1
 Beaverdam Run Shale Member (of the Newton Hamilton Formation), Devonian: Swain, F.M., Jr., 3
 Blue Ridge Conglomerate, Cambrian: Platt, F., 1
 Brandt Sandstone (in the Kingsley Member of the Wellersburg Monothem), Devonian: Caster, K.E., 2
 Brush Creek Red Bed (in the Conemaugh Formation), Pennsylvanian: Swartz, C.K., 3
 Buffalo Creek Sandstone Member (of the Conemaugh Formation), Pennsylvanian: Stone, R.W., 1
 Buffalo Run Limestone, Cambrian: Walcott, C.D., 6
 Buffalo Springs Member (of the Conococheague Formation), Cambrian: Gray, C., 12
 Calvin Run Limestone, *see* Colvin Limestone Member
 Carnahan Run Shale (Member of the Conemaugh Formation), Pennsylvanian: Burke, J.J., 1
 Catawissa Reds, Devonian: Chadwick, G.H., 4
 Colvin Limestone Member (of the Washington Formation), Permian: White, I.C., 6
 Colvins Run Limestone, *see* Colvin Limestone Member
 Colvins Run Limestone Member, *see* Colvin Limestone Member
 Conewango Conglomerate Member (of the Gettysburg Formation), Triassic: Stose, G.W., 1
 Connellsville red beds (in the Conemaugh Formation), Pennsylvanian: Swartz, C.K., 3
 Coplay Formation, Ordovician: Willard, B., 18
 Cotton Formation, Devonian: Chadwick, G.H., 5
 Elkland Parvafacies, Devonian-Mississippian: Caster, K.E., 1
 Epler Formation, Ordovician: Hobson, J.P., Jr., 1
 Furnace Creek quartz-diorite Gneiss, Precambrian: Buckwalter, T.V., Jr., 3
 Gatesburg Formation, Cambrian: Butts, C., 1
 Germania Formation, Devonian: Woodruff, J.G., 1

Gurnee Formation (sic!) (in the Pottsville Formation), Pennsylvanian: Ashley, G.H., 3
Gwynned Shale, Triassic: Lyman, B.S., 4
Hares Valley Shale Member (of the Newton Hamilton Formation), Devonian: Swain, F.M., Jr., 3
Hayfield Limestone, Devonian or Mississippian: Caster, K.E., 1
Hayfield Shale, Devonian or Mississippian: Chadwick, G.H., 1
Hershey Limestone, Ordovician: Gray, C., 3
Homewood Sandstone Member (of the Pottsville Formation), Pennsylvanian: White, I.C., 1
Hungry Run Sandstone Member (of the Orangeville Shale), Mississippian: deWitt, W., Jr., 1
Irvineton Parvafacies, Devonian: Caster, K.E., 1
Juniata Formation, Ordovician: Clark, W.B., 1
Lakemont Formation, Silurian: Ulrich, E.O., 2
Lancaster Limestone, Cambrian-Ordovician: Lesley, J.P. *in* Frazer, P., Jr., 2
Lima Granite, age unknown: Tomlinson, W.H., 3
Limeport Limestone, Cambrian: Howell, B.F., Sr., 2
Mahoning Red Bed, Pennsylvanian: Swartz, C.K., 3
Marburg Schist, Precambrian: Jonas, A.I., 1
Meyersdale Limestone, Pennsylvanian: Swartz, C.K., 3
Meyersdale red shale (in the Conemaugh Formation), Pennsylvanian: Swartz, C.K., 2
Millers Sandstone, Devonian or Mississippian: Chadwick, G.H., 3
Mont Alto Lignite, Tertiary: Lesley, J.P., 7
Montrose Sandstone, Devonian: Vanuxem, L., 1
Morgantown Member (of the Conemaugh Formation), Pennsylvanian: Johnson, M.E., 1
Myerstown Limestone, Ordovician: Gray, C., 3
Nadine Limestone (Member of the Conemaugh Formation), Pennsylvanian: Burke, J.J., 1
Nagany Limestone, Ordovician: Bassler, R.S., 4
Newton Hamilton Formation, Devonian: Swain, F.M., Jr., 3
Niverton Shale, Pennsylvanian: Swartz, C.K., 3
Oak Hill Member (of the Nealmont Limestone), Ordovician: Kay, G.M., 4
Ontelaunee Dolomite, Ordovician: Hobson, J.P., Jr., 1
Overbrook granite Gneiss, Precambrian: Bascom, F., *in* Mathews, E.B., 1
Peters Mountain Sandstone (Member of the Pocono Formation), Mississippian: Willard, B., 2
Ponent Conglomerate, *see* Ponent Series
Ponent red sandstone, *see* Ponent Series
Ponent Series, Devonian-Mississippian: Rogers, H.D., 4
Poxino Island Shale, Silurian: White, I.C., 2
Premedidial Series, Devonian: Rogers, H.D., 4
Primal Series, Ordovician: Rogers, H.D., 4
Richland Member (of the Conococheague Formation), Cambrian: Gray, C., 12
Rickenback Dolomite, Ordovician: Hobson, J.P., Jr., 1
Saegerstown Shale, Devonian or Mississippian: Chadwick, G.H., 3
Schaefferstown Member (of the Conococheague Formation), Cambrian: Gray, C., 12
Schreyfogels Limestone, Mississippian: Platt, F., 2
Schuylkill Member (of the Pottsville Formation), Pennsylvanian: Wood, G.H., Jr., 1
Seral Conglomerate, *see* Seral Series
Seral Series, Pennsylvanian: Rogers, H.D., 4
Sharp Mountain Member (of the Pottsville Formation), Pennsylvanian: Wood, G.H., Jr., 1
Shellhammer Hollow Formation, Mississippian: deWitt, W., Jr., 1
Snitz Member (of the Conococheague Formation), Cambrian: Gray, C., 12
South Mountain Quartzite, *see* Chickies Quartzite
South Mountain slates, Cambrian: Platt, F., 1
South Valley Hills slates and mica schists, Precambrian: Hall, C.E., 1
South Valley Limestone, Triassic: Lesley, J.P., 10
Stormville Sandstone, Devonian: Weller, S., 1

Susquehanna Series, Devonian: Ashley, G.H., 2
Swatara iron sandstone, Silurian: Swartz, C.K., 6
Taylor Sandstone, Permian: Hennen, R.V., 1
Triumph Conglomerate, Pennsylvanian: Carll, J.F., 1
Tumbling Run Member (of the Pottsville Formation), Pennsylvanian: Wood, G.H., Jr., 1
Tuscarora Quartzite, Silurian: Clark, W.B., 1
Valley Forge Quartzite, Cambrian: Bascom, F., *in* Mathews, E.B., 1
Valley View Member (of the Curtin Limestone), Ordovician: Kay, G.M., 2
Vespertine Series, Mississippian: Rogers, H.D., 4
Waynesburg Sandstone Member (of the Washington Formation), Permian: Stevenson, J.J., 1
Wissahickon mica gneiss, Precambrian: Bascom, F., 1
Woodcock Sandstone, Devonian or Mississippian: Chadwick, G.H., 3
York Limestone, Cambrian-Ordovician: Frazer, P., Jr., 1

UNCONFORMITY
  Eastern Pennsylvania, Devonian: Willard, B., 8

UNION COUNTY, *see also* Pennsylvania and Pennsylvania-Central
  Economic geology
    iron: Earle, R.B., 1

UNIONITE, *see also* Mineralogy
  Chester Co.: Silliman, B., Jr., 1

URANINITE, *see also* Radioactive minerals
  Northampton Co.: Montgomery, A., 6

URANIUM, *see also* Mineral resources, Radioactive minerals, and uranium-bearing minerals
  Bucks Co.: McCauley, J.F., 1; McKeown, F.A., 2
  Carbon Co.: Klemic, H., 1, 2; McCauley, J.F., 1
    Pottsville Formation: Walthier, T.N., 1
  Clearfield Co., Lower Freeport Coal: Patterson, E.D., 1
  Eastern Pennsylvania: Kaiser, E.P., 1
  Huntingdon Co.: McCauley, J.F., 1
  Northcentral Pennsylvania: Brummer, J.J., 1
  Northeastern Pennsylvania: McCauley, J.F., 1
  Pennsylvania: Bolger, R.C., 7; McCauley, J.F., 2
  Schuylkill Co., Minersville-Tremont Quads.: Wood, G.H., Jr., 2
  Southeastern Pennsylvania, Triassic area: Walthier, T.N., 1

VENANGO COUNTY, *see also* Pennsylvania, Pennsylvania-Northwestern and Pennsylvania-Western
  Economic geology
    petroleum: Lombard, T.C., 1; Murray, D., 1
      Hamilton Corners Oil Field: Fettke, C.R., 49
  Geophysical investigations
    electrical logging, Oil City area: Gillingham, W.J., 1
  Historical geology
    Devonian-Mississippian, Berea Sandstone: deWitt, W., Jr., 1
    Devonian-Pennsylvanian: Lytle, W.S., 10, 12
      Foxburg Quad.: Angermann, T.W., 1
  Maps
    Economic, coal, bituminous: Alford, N.G., 1
  Paleontology
    Brachiopoda, Mississippian: Winchell, A., 1
    Eurypterida, Pennsylvanian: Kjellesvig-Waering, E.N., 1; O'Connell, M., 1
    Gastropoda, Mississippian: Winchell, A., 1
    Pisces, Mississippian: Newberry, J.S., 1
    Porifera, Mississippian: Hall, J., 14, 23
  Petrology
    clay minerals: Droste, J.B., 4
  Physiographic geology
    Good Cave: Smith, G.G., Jr., 1

VERMICULITE, *see also* Mineral resources and Mineralogy
  Chester Co.: Brush, G.J., 2
  Delaware Co.: Clarke, F.W., 3
  Northampton Co.: Catlett, C., 1; Clarke, F.W., 1

VERTEBRATA, *see also* individual types
  Pennsylvanian-Permian, Southwestern Pennsylvania: Moran, W.E., 1

VOLCANIC ROCKS, *see also* Igneous rocks
  Franklin Co., analyses: Washington, H.S., 1

WARREN COUNTY, *see also* Pennsylvania, Pennsylvania-Northern, Pennsylvania-Northwestern, and Pennsylvania-Western

- *Economic geology*
  - Petroleum and natural gas, Sheffield Quad.: Ingham, A.I., 3
- *Historical geology*
  - Devonian-Mississippian: Fettke, C.R., 19
  - Devonian-Pennsylvanian: Fettke, C.R., 33
    - Sheffield Quad.: Ingham, A.I., 3
  - Devonian-Pleistocene: Fettke, C.R., 29
  - Ordovician-Mississippian: Fettke, C.R., 24
  - Ordovician-Pleistocene: Fettke, C.R., 8
  - Silurian-Mississippian: Fettke, C.R., 20
- *Paleontology*
  - Brachiopoda
    - Devonian: Hall, J., 21; Schuchert, C., 1
    - Mississippian: Hall, J., 21
  - Crustacea, Devonian: Hall, J., 20
  - Edrioasteroidea, Mississippian: Clarke, J.M., 2; Foerste, A.F., 1
  - Eurypterida
    - Devonian: Kjellesvig-Waering, E.N., 1
    - Mississippian: O'Connell, M., 1
  - Nautiloidea
    - Devonian: Hall, J., 12
    - Mississippian: Hall, J., 18, 19
  - Pelecypoda, Devonian: Hall, J., 13, 15, 16, 17
  - Pisces, Devonian: Eastman, C.R., 1, 2
  - Porifera
    - Devonian: Caster, K.E., 3; Hall, J., 14, 23
    - Mississippian: Hall, J., 14, 23
- *Maps*
  - Economic, petroleum and natural gas, Sheffield Quad.: Ingham, A.I., 3
  - Isopach, Sheffield Quad.: Ingham, A.I., 3
  - Structure contour, Sheffield Quad.: Ingham, A.I., 3

WASHINGTON COUNTY, *see also* Pennsylvania, Pennsylvania-Southwestern, and Pennsylvania-Western
- *Economic geology*
  - coal, bituminous: Lesley, J.P., 5
    - analyses: Campbell, M.R., 5
    - reserves: Wallace, J.J., 4
  - fire clay: Lesley, J.P., 5
  - limestone: Lesley, J.P., 5
  - stone: Lesley, J.P., 5
- *Groundwater*
  - analyses: Clarke, F.W., 7
  - connate water: Steiger, G., 1
- *Historical geology*
  - Pennsylvanian-Permian: Cross, A.T., 1; Sherrill, R.E., 1
  - Permian: Arkle, T., Jr., 1; Cross, A.T., 6
- *Paleontology*
  - Amphibia, Permian: Romer, A.S., 3
  - Pisces, Permian: Romer, A.S., 1, 3
  - plants, Permian: Cross, A.T., 6
- *Petrology*
  - grahamite: Koppe, E.F., 2
  - sulphur-bearing coal: Mansfield, S.P., 1

WAYNE COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, Pennsylvania-Northeastern, and Pennsylvania-Northern
- *Economic geology*
  - coal, anthracite: Roberts, W.F., 7, 16
- *Geophysical investigations*
  - gravity: Duecker, J.C., 1

WEATHERING
- Allegheny Co., Pittsburgh Coal: Porter, H.C., 1
- Northeastern Pennsylvania, glacial till: Tedrow, J.C.F., 1
- Northwestern Pennsylvania, glacial clay: Droste, J.B., 1
- Venango Co., clay minerals: Droste, J.B., 4

WELLS AND WELL LOGS
- Beaver Co., Pennsylvanian: Van Tuyl, D.W., 3
- Berks Co.: Gault, H.R., 3
- Bradford Co.: Fettke, C.R., 12
- Bucks Co.: Woolman, L., 1
- Butler Co.: Fettke, C.R., 15
- Cameron Co.: Fettke, C.R., 43
- Clinton Co., Leidy Gas Field: Ebright, J.R., 3
- Elk Co.: Fettke, C.R., 35, 37
- Erie Co.: Fettke, C.R., 11, 14, 23
- Forest Co.: Fettke, C.R., 10
- McKean Co.: Fettke, C.R., 7, 9, 16, 17, 18, 22, 26, 27, 30, 32
- Mercer Co.: Wagner, W.R., 2
- Northampton Co.: Woolman, L., 1
- Pennsylvania: Darton, N.H., 3; Fuller, M.L., 1, 2
- Potter Co.: Fettke, C.R., 6, 25
- Snyder Co.: Wagner, W.R., 1
- Tioga Co.: Fettke, C.R., 13, 21
- Warren Co.: Fettke, C.R., 8, 19, 20, 24, 33; Fuller, M.L., 1
- Western Pennsylvania: Wagner, W.R., 4

WESTMORELAND COUNTY, *see also* Pennsylvania, Pennsylvania-Southwestern, and Pennsylvania-Western

Areal geology
  Donegal Quad.: Shaffner, M.N., 2
  New Florence Quad.: Shaffner, M.N., 1, 5
Economic geology
  clay: Grasty, J.S., 1
    New Florence Quad.: Shaffner, M.N., 1, 5
  coal, bituminous: Antisell, T., 1; Grasty, J.S., 1; Lesley, J.P., 4
    Donegal Quad.: Shaffner, M.N., 2
    Freeport Quad.: Koppe, E.F., 3
    New Florence Quad.: Shaffner, M.N., 1, 3, 4, 5
    New Kensington Quad.: Koppe, E.F., 3
    reserves: Dowd, J.J., 5
  fire clay: Hopkins, T.C., 3
    Donegal Quad.: Shaffner, M.N., 2
  iron, New Florence Quad.: Shaffner, M.N., 1, 5
  limestone: Antisell, T., 1; Grasty, J.S., 1
    Donegal Quad.: Shaffner, M.N., 2
    New Florence Quad.: Shaffner, M.N., 1, 5
  natural gas: Grasty, J.S., 1
    Donegal Quad.: Shaffner, M.N., 2
    New Florence Quad.: Shaffner, M.N., 1, 5
  nitrate: Mansfield, G.R., 1
  sand and gravel, New Florence Quad.: Shaffner, M.N., 5
  sandstone
    Donegal Quad.: Shaffner, M.N., 2
    New Florence Quad.: Shaffner, M.N., 1, 5
  shale, Donegal Quad.: Shaffner, M.N., 2
Engineering geology
  railroad cuts: Philbrick, S.S., 2
Ground water
  analyses, Ligonier well: Kidwell, C.H., 1
  New Florence Quad.: Shaffner, M.N., 5
Historical geology
  Devonian-Pennsylvanian
    Donegal Quad.: Shaffner, M.N., 2
    New Florence Quad.: Shaffner, M.N., 1
  Devonian-Pleistocene, New Florence Quad.: Shaffner, M.N., 5
  Pennsylvanian, Freeport Quad.: Koppe, E.F., 1
Maps
  Economic
    coal, bituminous: Dowd, J.J., 5
      New Florence Quad.: Shaffner, M.N., 5
    mineral resources
      Donegal Quad.: Shaffner, M.N., 2
      New Florence Quad.: Shaffner, M.N., 1, 5
  Geologic
    Donegal Quad.: Shaffner, M.N., 2
    New Florence Quad.: Shaffner, M.N., 1, 5
  Structure contour
    Donegal Quad., Lower Kittanning Coal: Shaffner, M.N., 2
    New Florence Quad., Lower Kittanning Coal: Shaffner, M.N., 1
Paleontology
  amphibian tracks, Pennsylvanian: Hitchcock, E., 1
Petrology
  Freeport Coal parting: Koppe, E.F., 1
Physiographic geology
  caves: Dunn, J.R., 4
    Bear Cave: Risler, G., 1
    Ken's Cave: Nelson, B., 1
    Lycippus Cave: Dunn, J.R., 1

WORMS, *see also* Invertebrata
  Chester Co., Cambrian: Lyman, B.S., 5
  Lehigh Co., Cambrian: Lyman, B.S., 5
  Southeastern Pennsylvania, Cambrian: Goeppert, J.H.R., 2

WURZITE, *see also* Mineralogy
  Allegheny Co., polymorphs: Frondel, C., 1; Seaman, D.M., 1

WYOMING COUNTY, *see also* Pennsylvania, Pennsylvania-Eastern, and Pennsylvania-Northeastern
  Economic geology
  coal, anthracite: Silliman, B., Sr., 1
  Physiographic geology
  glacial erosion: Crosby, I.B., 1

X-RAY INVESTIGATIONS
  brucite, Lancaster Co.: Brindley, G.W., 1
  glacial till, Northwestern Pennsylvania: Droste, J.B., 1, 2, 4
  slate, Lehigh-Northampton Cos.: Anderson, H.V., 1
  underclay, Western Pennsylvania: Schultz, L.G., 1

XENOLITHS, *see also* Igneous rocks
  Delaware Co.: Tomlinson, W.H., 3

YORK COUNTY, *see also* Pennsylvania, Pennsylvania-Southcentral, and Pennsylvania-Southeastern
  Areal geology
  Carlisle Quad.: Stose, G.W., 4
  Hanover area: Weaver, K.N., 1
  Economic geology
  clay, Carlisle Quad.: Stose, G.W., 4

iron: Frazer, P., Jr., 3; Hotz, P.E., 1
  Carlisle Quad.: Stose, G.W., 4
manganese, Carlisle Quad.: Stose, G.W., 4

Geophysical investigations
aeromagnetic, Safe Harbor Quad.: Socolow, A.A., 15

Historical geology
Precambrian: Jonas, A.I., 1
Precambrian-Triassic, Carlisle Quad.: Stose, G.W,. 4

Maps
Aeromagnetic, Safe Harbor Quad.: Bromery, R.W., 16
Geologic, Carlisle Quad.: Stose, G.W., 4

Mineralogy
limonite pseudomorphs: Anonymous, 25

Paleontology
Amphibia, Triassic: Branson, E.B., 1
Brachiopoda, Cambrian: Walcott, C.D., 1, 2, 3, 5
Branchiopoda, Triassic: Bock, W., 4; Raymond, P.E., 3
plants, Triassic: Berry, E.W., 1
Reptilia, Triassic: Baird, D., 1; Cope, E.D., 5
Triassic fauna: Wanner, H.E., 1
Trilobita, Cambrian: Resser, C.E., 5; Walcott, C.D., 7

Petrology
Conestoga Limestone, petrofabrics: Nickelsen, R.P., 4
granophyre: Hotz, P.E., 4
Peach Bottom Slate: Agron, S.L., 2
Port Deposit Granodiorite: Cloos, E., 1

Physical geology
cleavage: Cloos, E., 1
deformation, Peach Bottom Syncline: Agron, S.L., 1, 2

ZINC, *see also* Mineral resources and zinc-bearing minerals
Bucks Co.: Gault, H.R., 5
Chester Co.: Woodhouse, J., 1
Columbia Co.: Earle, K.M., 1
Lehigh Co.: Childs, M.S., 1; Gray, C., 13; Hoy, R.B., 1

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